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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R3–ES–2019–0020; FF09E21000 FXES11110900000 201]

RIN 1018-BD98

Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Big Creek Crayfish and St. Francis River Crayfish and Designations of Critical Habitat

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: After review of the best available scientific and commercial information, we, the U.S. Fish and Wildlife Service (Service), propose to list two Missouri species, the Big Creek crayfish (*Faxonius peruncus*) and the St. Francis River crayfish (*Faxonius quadruncus*), as threatened species under the Endangered Species Act of 1973, as amended (Act). If we finalize this rule as proposed, it would extend the Act’s protections to both species. We also propose a species-specific rule issued under section 4(d) of the Act (“4(d) rule”) that provides for the protection of the Big Creek crayfish and the St. Francis River crayfish and to designate critical habitat for both species under the Act. In total, approximately 1,069 river miles (1,720 river kilometers) fall within the boundaries of the proposed critical habitat designation for the Big Creek crayfish, and approximately 1,043 river miles (1,679 river kilometers) fall within the boundaries of the proposed critical habitat designation for the St. Francis River crayfish. Finally, we announce the

availability of a draft economic analysis of the proposed critical habitat designations.

DATES: We will accept comments received or postmarked on or before **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

Comments submitted electronically using the Federal eRulemaking Portal (see **ADDRESSES**, below) must be received by 11:59 p.m. Eastern Time on the closing date.

We must receive requests for public hearings, in writing, at the address shown in **FOR FURTHER INFORMATION CONTACT** by **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: *Written comments:* You may submit comments by one of the following methods:

(1) *Electronically:* Go to the Federal eRulemaking Portal:

<http://www.regulations.gov>. In the Search box, enter FWS–R3–ES–2019–0020, which is the docket number for this rulemaking. Then, click on the Search button. On the resulting page, in the Search panel on the left side of the screen, under the Document Type heading, check the Proposed Rule box to locate this document. You may submit a comment by clicking on “Comment Now!”

(2) *By hard copy:* Submit by U.S. mail to: Public Comments Processing, Attn: FWS–R3–ES–2019–0020, U.S. Fish and Wildlife Service, MS: BPHC, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We request that you send comments only by the methods described above. We will post all comments on <http://www.regulations.gov>. This generally means that we will post any personal information you provide us (see *Public Comments*, below, for more information).

Availability of supporting materials: For the critical habitat designation, the coordinates or plot points or both from which the maps are generated are included in the administrative record and are available at <https://www.fws.gov/midwest/>; and at <http://www.regulations.gov> under Docket No. FWS–R3–ES–2019–0020; and at the Columbia, Missouri Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**). Any additional tools or supporting information that we may develop for the critical habitat designation will also be available at the Service website and Field Office set out above, and may also be included in the preamble of this proposed rule and/or at <http://www.regulations.gov>.

FOR FURTHER INFORMATION CONTACT: Karen Herrington, Field Supervisor; U.S. Fish and Wildlife Service; Columbia, Missouri Ecological Services Field Office; 101 Park DeVille Drive, Suite A; Columbia, MO 65203-0057; telephone 573-234-2132. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Relay Service at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Act, if we determine that a species may be an endangered or threatened species throughout all or a significant portion of its range, we are required to promptly publish a proposal in the *Federal Register* and make a determination on our proposal within 1 year. To the maximum extent prudent and determinable, we must designate critical habitat for any species that we determine to be an endangered or threatened species under the Act. Listing a species as an endangered or threatened species and designation of critical habitat can only be completed by issuing a

rule.

What this document does. We propose the listing of the Big Creek crayfish and St. Francis River crayfish as threatened species with a rule issued under section 4(d) of the Act, and we propose the designation of critical habitat for both species.

The basis for our action. Under the Act, we may determine that a species is an endangered or threatened species based on any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We have determined that displacement (Factor E) by the woodland crayfish (*Faxonius hylas*) is the primary threat to both the Big Creek crayfish and the St. Francis River crayfish. However, degraded water quality (Factor A) from heavy metal mining activities in the watershed is impacting the species and may act synergistically with the spread of the nonnative woodland crayfish and subsequent displacement of the Big Creek crayfish and St. Francis River crayfish. The existing regulatory mechanisms are not adequate to reduce these threats to a level that the species do not warrant listing (Factor D).

Section 4(a)(3) of the Act requires the Secretary of the Interior (Secretary) to designate critical habitat concurrent with listing to the extent prudent and determinable. Section 4(b)(2) of the Act states that the Secretary will make the designation on the basis of the best available scientific data after taking into consideration the economic impact, the impact on national security, and any other relevant impact of specifying any particular area as critical habitat. Section 3(5)(A) of the Act defines critical habitat as (i) the

specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed if such areas are essential to the conservation of the species.

Peer Review. In accordance with our joint policy on peer review published in the *Federal Register* on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act, we sought the expert opinions of four (and received responses from two) appropriate specialists regarding the species status assessment report, which informed this proposed rule. The purpose of peer review is to ensure that the science behind our listing determinations, the critical habitat designations, and 4(d) rule are based on scientifically sound data, assumptions, and analyses. The peer reviewers have expertise in the biology, habitat, and stressors to the species. Additionally, we received review from three other experts outside the Service (State and academic), some of whom also collaborated with our species status assessment team during the species status assessment process, but were not part of the formal peer review process.

Information Requested

Public Comments

We intend that any final action resulting from this proposed rule will be based on the best scientific and commercial data available and be as accurate and as effective as possible. Therefore, we request comments or information from other concerned governmental agencies, Native American tribes, the scientific community, industry, or

any other interested parties concerning this proposed rule. We particularly seek comments concerning:

(1) The species' biology, range, and population trends, including:

(a) Biological or ecological requirements of these species, including habitat requirements for feeding, breeding, and sheltering;

(b) Genetics and taxonomy;

(c) Historical and current range, including distribution patterns;

(d) Historical and current population levels, and current and projected trends; and

(e) Past and ongoing conservation measures for these species, their habitats, or both.

(2) Factors that may affect the continued existence of the species, which may include habitat modification or destruction, overutilization, disease, predation, the inadequacy of existing regulatory mechanisms, or other natural or manmade factors.

(3) Biological, commercial trade, or other relevant data concerning any threats (or lack thereof) to these species and existing regulations that may be addressing those threats.

(4) Additional information concerning the historical and current status, range, distribution, and population size of these species, including the locations of any additional populations of either species.

(5) Information concerning activities that should be considered under a rule issued in accordance with section 4(d) of the Act (16 U.S.C. 1531 *et seq.*) as a prohibition or exemption within U.S. territory that would contribute to the conservation of the species. In particular, information concerning whether import, export, and activities

related to sale in interstate and foreign commerce should be prohibited, or whether any other activities should be considered excepted from the prohibitions in the 4(d) rule.

(6) Additional provisions the Service may wish to consider for a 4(d) rule in order to conserve, recover, and manage the Big Creek crayfish and the St. Francis River crayfish, such as the best management practices used in agriculture or mining.

(7) The reasons why we should or should not designate habitat as “critical habitat” under section 4 of the Act (16 U.S.C. 1531 *et seq.*), including whether there are threats to the species from human activity, the degree of which can be expected to increase due to the designation, and whether that increase in threat outweighs the benefit of designation such that the designation of critical habitat may not be prudent.

(8) Specific information on:

(a) The amount and distribution of Big Creek crayfish and St. Francis River crayfish habitat;

(b) Which areas that were occupied at the time of listing and that contain the physical or biological features essential to the conservation of these species should be included in the critical habitat designations and why;

(c) Special management considerations or protection that may be needed in critical habitat areas we are proposing, including managing for the potential effects of climate change; and

(d) What areas not occupied at the time of listing are essential for the conservation of the species and why.

(9) Land use designations and current or planned activities in the subject areas and their possible impacts on proposed critical habitat.

(10) Any probable economic, national security, or other relevant impacts of designating any area that may be included in the final designations, and the benefits of including or excluding areas that may be impacted.

(11) Information on the extent to which the description of probable economic impacts in the draft economic analysis is a reasonable estimate of the likely economic impacts.

(12) Whether any specific areas we are proposing for critical habitat designation should be considered for exclusion under section 4(b)(2) of the Act, and whether the benefits of potentially excluding any specific area outweigh the benefits of including that area under section 4(b)(2) of the Act.

(13) Whether we could improve or modify our approach to designating critical habitat in any way to provide for greater public participation and understanding, or to better accommodate public concerns and comments.

Please include sufficient information with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include.

Please note that submissions merely stating support for, or opposition to, the action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or a threatened species must be made “solely on the basis of the best scientific and commercial data available.”

You may submit your comments and materials concerning this proposed rule by one of the methods listed in **ADDRESSES**. We request that you send comments only by the methods described in **ADDRESSES**.

If you submit information via <http://www.regulations.gov>, your entire submission—including any personal identifying information—will be posted on the website. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on <http://www.regulations.gov>.

Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on <http://www.regulations.gov>, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Columbia, Missouri Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Public Hearing

Section 4(b)(5) of the Act provides for a public hearing on this proposal, if requested. Requests must be received by the date specified above in **DATES**. Such requests must be sent to the address shown in **FOR FURTHER INFORMATION CONTACT**. We will schedule a public hearing on this proposal, if requested, and announce the date, time, and place of the hearing, as well as how to obtain reasonable accommodations, in the *Federal Register* and local newspapers at least 15 days before the hearing. For the immediate future, we will provide these public hearings using webinars that will be announced on the Service's website, in addition to the *Federal Register*. The

use of these virtual public hearings is consistent with our regulation at 50 CFR 424.16(c)(3).

Previous Federal Actions

There have been no previous Federal actions for these species, and the Service's status review was undertaken on a voluntary basis as a discretionary action because we were aware of information that these species may be in danger of extinction. Neither species was petitioned for listing.

Supporting Documents

A species status assessment (SSA) team prepared an SSA report for the Big Creek crayfish and the St. Francis River crayfish. The SSA team was composed of Service biologists, in consultation with other species experts. The SSA report represents a compilation of the best scientific and commercial data available concerning the status of the species, including the impacts of past, present, and future factors (both negative and beneficial). The SSA report underwent independent peer review by scientists with expertise in crayfish biology, habitat management, and stressors (factors negatively affecting the species) to the species. The SSA report and other materials relating to this proposal can be found on the Midwest Region website at <https://www.fws.gov/midwest/> and at <http://www.regulations.gov> under Docket No. FWS-R3-ES-2019-0020.

I. Proposed Listing Determination

Background

A thorough review of the taxonomy, life history, and ecology of the Big Creek crayfish and the St. Francis River crayfish is presented in the SSA report (Service 2018, entire).

The Big Creek crayfish (*Faxonius peruncus*) is a small, olive-tan crayfish with blackish blotches and specks over the upper surface of pincers, carapace, and abdomen. Length of adult individuals ranges from 1.1 to 2.2 inches (in) (2.8 to 5.6 centimeters (cm)). The St. Francis River crayfish (*Faxonius quadruncus*) is a small, dark brown crayfish with blackish blotches or specks over the upper surfaces of the pincers, carapace, and abdomen. Length of adult individuals of St. Francis River crayfish have been observed to be similar to adult Big Creek crayfish.

Both the Big Creek crayfish and the St. Francis River crayfish have localized distributions in the Upper St. Francis River watershed upstream of Wappapello Dam in Iron, Madison, St. Francois, Washington, and Wayne Counties in southeastern Missouri. The Big Creek crayfish appears most abundant in Big Creek and other streams on the west side of the watershed and primarily Twelvemile Creek subwatersheds on the east side, while the St. Francis River crayfish mainly inhabits the upper St. Francis River tributaries on the upper end of the Upper St. Francis River watershed. Despite occupying the Upper St. Francis River watershed at a coarse spatial scale, these two species have been observed at the same location only seven times and exhibit mostly discrete distributions (Westhoff 2011, pp. 34–36).

Big Creek crayfish are generally found in streams with widths less than 33 feet (ft) (10 meters (m)) under small rocks or in shallow burrows in headwater streams and small rocky creeks in shallow depths. St. Francis River crayfish are generally found in swiftly moving streams under rocks and boulders in small headwater streams and up to moderately larger rivers. St. Francis River crayfish may prefer pool/backwater areas and run macrohabitats over faster riffles.

Given that both the Big Creek crayfish and St. Francis River crayfish are habitat generalists (Westhoff 2017 pers. comm.) and not all reaches of streams within the watershed have been sampled, it is likely that the species occur at more locations in the watershed. Therefore, we defined the species' ranges as the streams within subwatersheds (12-digit hydrologic units) known to be occupied by each species (Figure 1). We consider these ranges to be a more accurate depiction of the actual ranges of the Big Creek Crayfish and St. Francis River Crayfish than using only known locations. Within its range, the Big Creek Crayfish is found in 983 river miles (rmi) (1,581 river kilometers (km)) in the Upper St. Francis watershed. The St. Francis River Crayfish is found in 944 rmi (1,519 km). Within the St. Francis River mainstem (where it is a 5th order stream), the Big Creek crayfish intermittently occurs in 86 rmi (139 km) and the St. Francis River crayfish occurs in 99 rmi (159 km). Few individuals of any crayfish species have been collected in these reaches (Westhoff 2018 pers. comm.) and the crayfishes likely only occur in the mainstem intermittently, using these areas for connectivity between subwatersheds.

Individuals of the Big Creek crayfish and St. Francis River crayfish mate in the fall. Big Creek crayfish females generate an average of 61 eggs, whereas St. Francis River crayfish females generate an average of 43 to 81 eggs. The normal lifespan for both the Big Creek crayfish and the St. Francis River crayfish appears to be about 2 years (Pflieger 1996, pp. 116, 122). We presume that both species' feeding habits are similar to those of other crayfish species in the region, and their diets likely consist of plant detritus, periphyton, and invertebrates.

Based on genetic analyses, we consider the Big Creek crayfish species to consist

of two populations (referred to as the Main and Twelvemile Creek populations), whereas the St. Francis River crayfish species consists of a single population (Figure 1). We have no evidence to suggest that there has been a reduction in the number of populations for either species from historical conditions. For analytical purposes and for better representation of groups of individuals that occupy the same area and are subject to the same environmental pressures, we defined finer-scale subpopulations. We consider a subpopulation to be those individuals that are able to interbreed and occur within the same stream reach of occupied habitat. Therefore, multiple subpopulations make up the single population (and species) of the St. Francis River crayfish and multiple subpopulations make up the two populations of the Big Creek crayfish. In order for Big Creek crayfish and St. Francis River crayfish subpopulations to be healthy, they require a population size and growth rate sufficient to withstand natural environmental fluctuations, and habitat of sufficient quantity and quality to support all life stages (specific details of each of these requirements remains unclear). Healthy subpopulations of each species also require gene flow among subpopulations and a native community structure free from nonnative crayfish species that may outcompete and ultimately displace the two species (for more information, see chapter 2 of the SSA report).

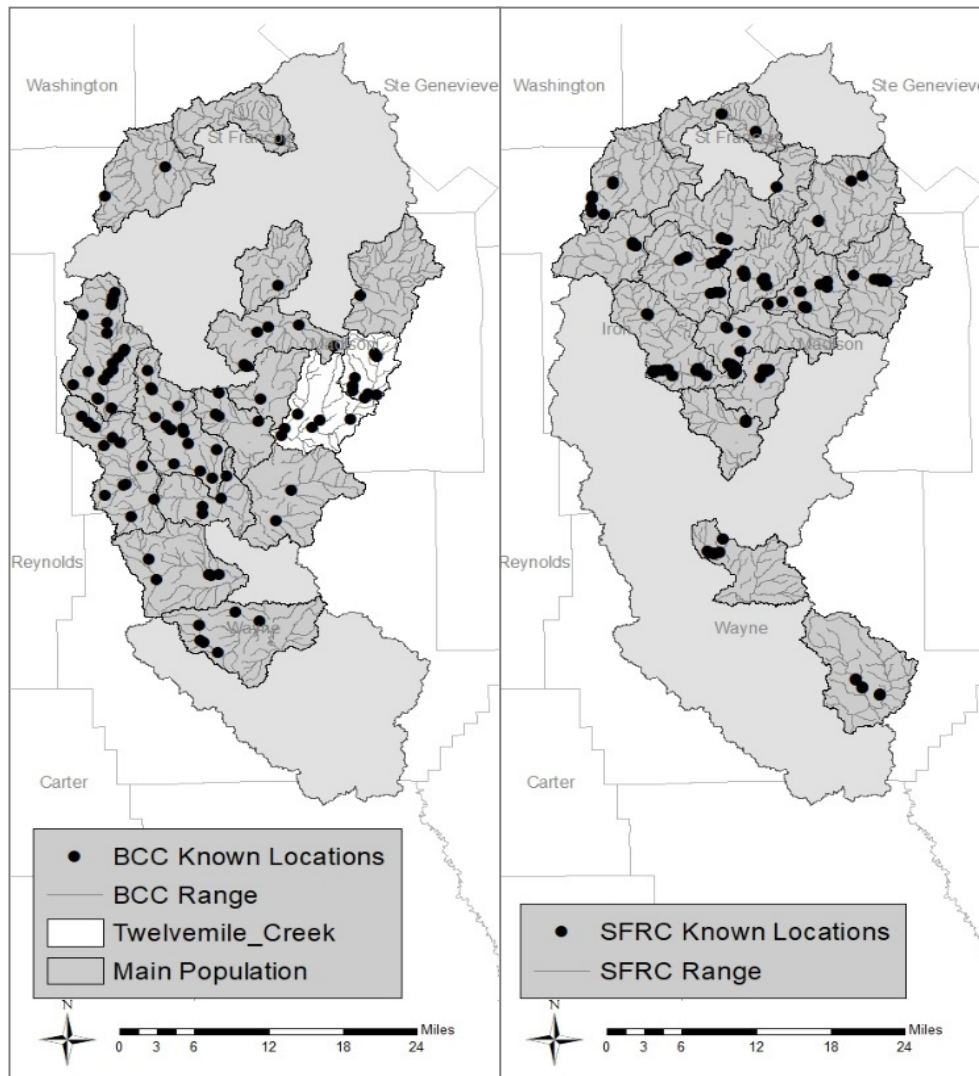


Figure 1. Distribution of the Big Creek crayfish (BCC; left) and St. Francis River crayfish (SFRC; right) in the Upper St. Francis River watershed, Missouri. The St. Francis River mainstem is not included because crayfish movement is only intermittent.

Summary of Biological Status and Threats

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations in title 50 of the Code of Federal Regulations (50 CFR part 424) set forth the procedures for determining whether a species is an “endangered species” or a “threatened species.” The

Act defines an endangered species as a species that is “in danger of extinction throughout all or a significant portion of its range,” and a threatened species as a species that is “likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” The Act requires that we determine whether any species is an “endangered species” or a “threatened species” because of any of the following factors:

- (A) The present or threatened destruction, modification, or curtailment of its habitat or range;

- (B) Overutilization for commercial, recreational, scientific, or educational purposes;

- (C) Disease or predation;

- (D) The inadequacy of existing regulatory mechanisms; or

- (E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species’ continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

We use the term “threat” to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term “threat” includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or

required resources (stressors). The term “threat” may encompass—either together or separately—the source of the action or condition or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an “endangered species” or a “threatened species.” In determining whether a species meets either definition, we must evaluate all identified threats by considering the expected response by the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species, such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an “endangered species” or a “threatened species” only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future.

In our determination, we correlate the threats acting on the species to the factors in section 4(a)(1) of the Act. The SSA report documents the results of our comprehensive biological status review for each species, including an assessment of the potential stressors to the species. Those results do not represent a decision by the Service on whether the species should be proposed for listing as an endangered species or threatened species under the Act. They do, however, provide the scientific basis that informs our regulatory decisions, which involves the further application of standards within the Act and its implementing regulations and policies. The following is a summary of the key

results and conclusions from the SSA report; the full SSA report can be found on the Midwest Region website at <https://www.fws.gov/midwest/> and at <http://www.regulations.gov> under Docket No. FWS–R3–ES–2019–0020.

Summary of Analysis

The SSA process can be categorized into three sequential stages. During the first stage, we evaluate individual species' life-history needs. The next stage involves an assessment of the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. The final stage of the SSA involves making predictions about the species' responses to positive and negative environmental and anthropogenic influences. This process uses the best available information to characterize viability as the ability of a species to sustain populations in the wild over time. We use this information to inform our regulatory decision.

To assess the viability of the Big Creek crayfish and the St. Francis River crayfish, we used the three conservation biology principles of resiliency, representation, and redundancy (together, the 3 Rs) (Shaffer and Stein 2000, pp. 306–310). Briefly, resiliency supports the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years); representation supports the ability of the species to adapt over time to long-term changes in the environment (for example, climate changes); and redundancy supports the ability of the species to withstand catastrophic events (for example, large-scale droughts, floods, or chemical spills). In general, the more redundant and resilient a species is and the more representation it has, the more likely it is to sustain populations over time, even under

changing environmental conditions. Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species' viability.

The Big Creek crayfish and St. Francis River crayfish viability over time, is influenced by their resiliency, adaptive capacity (representation), and redundancy. Resiliency, in the case of the crayfishes, is best measured by the number, distribution, and health of populations (or subpopulations) across the species' ranges. Representation for both species can be measured by the number and distribution of healthy subpopulations across areas of unique adaptive diversity. For the Big Creek crayfish, this includes the Twelvemile Creek and Main populations; for the St. Francis River crayfish, it includes the species' entire range. Redundancy can be measured for the two species through the duplication and distribution of resilient subpopulations across the species' ranges.

Risk Factors for the Big Creek Crayfish and St. Francis River Crayfish

A multitude of natural and anthropogenic factors may impact the status of species within aquatic systems. The largest threat to the future viability of the Big Creek crayfish and the St. Francis River crayfish is displacement by a nonnative crayfish species. Contamination from heavy metal mining and habitat degradation from sedimentation also affects the species' viabilities. A brief summary of these primary stressors is presented below; for a full description of these stressors, refer to chapter 3 of the SSA report for each species.

Nonnative Crayfish

The introduction of non-native crayfish is one of the primary factors contributing to declining crayfish populations (Taylor et al. 2007, p. 374). Non-native crayfish species can displace native crayfishes through competition, differential predation, reproductive interference or hybridization, disease transmission, or a combination of these mechanisms (Lodge *et al.* 2000, pp. 9 & 12). Described below are effects of an invasive crayfish species on the Big Creek Crayfish and St. Francis River Crayfish.

Reproductive interference in the form of hybridization may be the main mechanism driving the displacement of the Big Creek crayfish and the St. Francis River crayfish. Genetic evidence of hybridization between the woodland crayfish and the Big Creek crayfish, as well as between the woodland crayfish and the St. Francis River crayfish has been documented (Fetzner *et al.* 2016 pp. 19–26). Alleles from both parental species detected in individuals in areas invaded by the woodland Crayfish, suggests that both native species readily hybridize with the woodland Crayfish (Fetzner *et al.* 2016, p. 28). Genetic swamping (a process by which the local genotype is replaced) appears to be the mechanism that leads to the eventual full displacement of the native species of crayfish.

In 1984, the woodland crayfish, endemic to southeastern Missouri, was first documented in the Upper St. Francis River watershed, which is outside of its native range (Pflieger 1996, p. 82). It is estimated that by 2008 (22 years later), the crayfish had invaded 5–20 percent of the total 3,225 rmi in the watershed (DiStefano and Westhoff 2011, pg. 40). Within areas invaded by the woodland crayfish, the distribution and abundance of the Big Creek crayfish and St. Francis River crayfish has been substantially impacted. In one stream, the Big Creek crayfish constituted 87 percent of the crayfish

community in areas not invaded by the woodland crayfish, but only 27 percent in invaded areas (DiStefano and Westhoff 2011, 40). Similarly, the St. Francis crayfish constituted 50 percent of the crayfish community in non-invaded areas, but only 13 percent in invaded areas of the stream. In the invaded areas of these streams, the woodland crayfish had become the dominant species, constituting 57-86 percent of the crayfish community (DiStefano and Westhoff 2011, p. 40).

The woodland crayfish's impact on abundance of the Big Creek crayfish and St. Francis River crayfish has resulted in the range contraction of both of the native species. In one stream, the range of the Big Creek crayfish contracted 9.1 rmi (14.7 km) from 2004 to 2009, simultaneous to the woodland crayfish expansion in the stream (DiStefano and Westhoff 2011, p. 40). In three other streams, the range of the St. Francis crayfish contracted in conjunction with the woodland crayfish invasion (Riggert *et al.* 1999, p. 1999; DiStefano 2008b, p. 419).

The woodland crayfish has been documented throughout much of the western portion of the Upper St. Francis River watershed (Figure 2). Though range contractions of the Big Creek crayfish and St. Francis River crayfish have only been documented in 4 streams, we conclude that the patterns of displacement and subsequent extirpation are likely happening throughout all of the invaded areas in the Upper St. Francis River watershed, with 5 of the 16 Big Creek crayfish watersheds invaded (31 percent) and 4 of the 16 St. Francis River crayfish subwatersheds invaded (25 percent). In addition, the known locations of the woodland crayfish are likely an under-representation of where the species is present in the watershed given that 1) the majority of locations were documented prior to 2010 and the species can expand at a rate as high as 745 yards (y)

per year (681 m per year) in the upstream direction and 2,499 y per year (2,285 m year) in the downstream direction (DiStefano and Westhoff 2011, pp. 38, 40); and 2) the woodland crayfish has already been introduced at several locations throughout the watershed and has likely been introduced at additional, undocumented locations (it is not feasible to survey every stream throughout the watershed). There is currently no means to slow or stop the spread of the woodland crayfish.

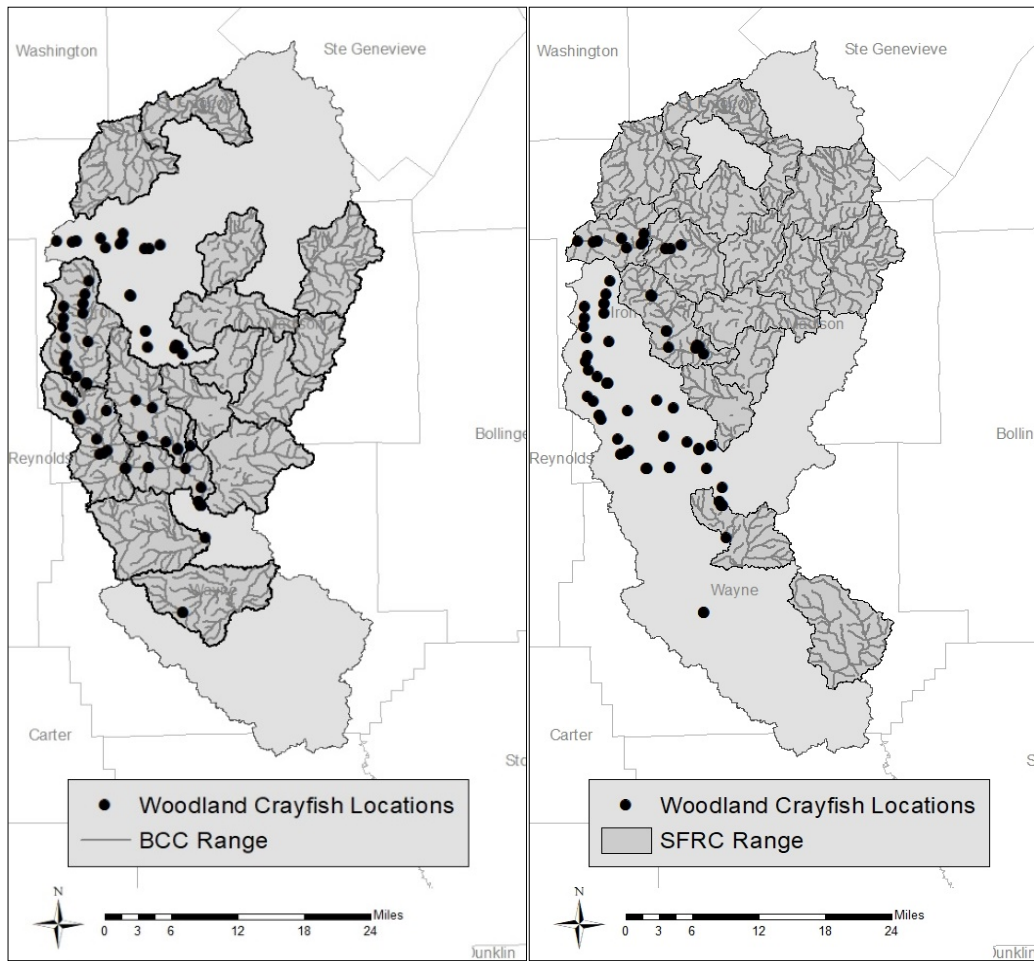


Figure 2. Known woodland crayfish locations relative to the distribution of the Big Creek crayfish (BCC; left) and St. Francis River crayfish (SFRC; right) in the Upper St. Francis River watershed, Missouri.

The main mechanism driving the displacement of the Big Creek crayfish and the St. Francis River crayfish appears to be reproductive interference by the woodland crayfish in the form of hybridization. Woodland crayfish have been observed engaging in mating behavior with St. Francis River crayfish (Westhoff 2011, p. 117). There is also genetic evidence of hybridization between the woodland crayfish and the Big Creek crayfish, as well as between the woodland crayfish and the St. Francis River crayfish (Fetzner *et al.* 2016 pp. 19–26), and at least some of the hybrid young appear to be viable (Fetzner *et al.* 2016, p. 29).

Contamination by Heavy Metal Mining

Southeastern Missouri has been a primary producer of lead since the early 1700s, in an area referred to as the Old Lead Mining Belt and more recently in an area referred to as the New Lead Mining Belt. Although most mining ceased in the 1970s, waste from mining operations is still present in the landscape, resulting in contamination of fish and other aquatic biota, alteration of fish and invertebrate communities, and public health advisories against human consumption of lead-contaminated fish (Czarneski 1985, pp. 17–23; Schmitt *et al.* 1993, pp. 468–471). The relocation of mine waste (chat) throughout the area as topsoil, fill material, and aggregate for roads, railroads, concrete, and asphalt has further expanded the area of contamination, as has aerial deposition from heavy metal smelters and the use of lead mining tailings for agricultural purposes due to their lime content. All of these uses have contributed to contamination of streams in portions of the Upper St. Francis River watershed. As a result, 32.4 rmi (52.1 km) of Little St. Francis River were added to the Environmental Protection Agency's (EPA) 303(d) list of impaired waters for not meeting water quality standards for lead. In 2012, a portion of

Big Creek (34.1 rmi) (54.9 km) was also added to the EPA's 303(d) list for not meeting water quality standards for lead and cadmium; that stream reach recently was removed from the 303(d) list for lead (in sediment) but remains listed for cadmium.

Studies conducted in southeastern Missouri and other areas demonstrate that heavy metal contamination adversely affects riffle-dwelling crayfish. In a study conducted in a watershed adjacent to that of the Upper St. Francis River, metal concentrations in crayfish at sites downstream of mining activities were significantly higher than those at reference sites (Allert *et al.* 2008, pp. 100–101). Significantly lower crayfish densities were observed at sites downstream of mining activities than those at reference sites, indicating that metals associated with mining activities have negative impacts on crayfish populations in Ozark streams (Allert *et al.* 2008, p. 100). Similar results were observed in other areas impacted by mining wastes (including sites in the Upper St. Francis River watershed), with sites downstream of mining activities having significantly higher metal concentrations in crayfish, reduced densities of crayfish (from 80 to 100 percent) (Allert *et al.* 2008, pp. 100-101; Allert *et al.* 2012, p. 567), and significantly lower survivorship (Allert *et al.* 2009, pp. 1210-1211). The mechanisms by which crayfish can be impacted by heavy metal contamination includes interference with orienting (Hubschman 1967, pp. 144-147; Lahman and Moore 2015, pp. 443-444), inhibition of respiration or aerobic metabolism (Khan *et al.* 2006, pp. 515-517); and increased susceptibility to predation (Wiggenton *et al.* 2010, p. 97). Approximately 22 percent of the Big Creek crayfish's range and 16 percent of the St. Francis River crayfish's range occur in areas with contaminated soil.

Sedimentation

In the Upper St. Francis River watershed, the absence of a deep cherty (a hard, dark, opaque rock composed of silica) residuum in the igneous Ozark uplift, combined with the formation of erosion-resistant upland soils, results in little gravel accumulation in alluvial floodplain soils. Streambank soils also are more cohesive than in most Ozark streams because of lower densities of gravel, with channel substrates containing a significant proportion of stable cobble, stone, and boulders, which provide habitat for crayfishes (Boone 2001, p. GE1). However, similar to many Ozark streams, streams within the Upper St. Francis River watershed may experience increased sedimentation in the future if land use changes or if riparian corridors are cleared. There have been impacts to three streams within the watershed that experienced excessive sedimentation due to eroding or breached mine tailings (Boone 2001, p. WQ4; DiStefano 2008a, p. 191). Breaches can spill a large volume of tailings, such as the 1,500 cubic y (1,200 cubic m) spilled into a stream in 1992 (Boone 2001, p. WQ4), and it can take multiple years for the aquatic community to begin to recover following a breach. Excessive deposition of fine sediment can cover rocks and cavities used by the Big Creek crayfish and St. Francis River crayfish as refugia (an area in which a population of organisms can survive through a period of unfavorable conditions). The loss of refugia likely results in reduced foraging habitat, thereby reducing carrying capacity and the density of subpopulations. The loss of refugia may also increase competition with the woodland crayfish and potentially facilitate displacement of the Big Creek crayfish and St. Francis River crayfish. The loss, caused by sedimentation, likely also increases predation risk. Crayfish presence is dependent on rocks embedded in little or no sediment and open interstitial spaces (Loughman *et al.* 2016, p. 645; Loughman *et al.* 2017, p. 5).

Synergistic Effects

In addition to individually affecting the species, it is likely that several of the above-summarized risk factors are acting synergistically or additively on both species. The combined impact of multiple stressors is likely more harmful than a single stressor acting alone. For example, in areas affected by lead mining contamination, the rate of displacement of Big Creek crayfish and St. Francis River crayfish by woodland crayfish may increase. Additionally, in areas invaded by the woodland crayfish, the loss of refugia from sedimentation may increase competition between the native species and the woodland crayfish. These combinations of stressors on the sensitive aquatic species in this habitat likely impact both native species more severely in combination than any one factor alone.

Conservation Actions

Monitoring and research on the Big Creek crayfish and St. Francis River crayfish have been conducted by the Missouri Department of Conservation (MDC) and various other organizations. Multiple evaluations of effects from lead mining contamination on crayfish, including the St. Francis River crayfish, have been conducted by the U.S. Geological Survey (USGS). Monitoring efforts benefit conservation of the Big Creek crayfish and St. Francis River crayfish by providing information on population health and trends and on the magnitude and extent of threats; research efforts provide information on mechanisms by which threats may impact the native crayfishes.

To help curtail the spread of nonnative crayfish in Missouri, MDC amended the Missouri Wildlife Code in 2011–2012, to increase regulations pertaining to the sale, purchase, and import of live crayfishes. While the virile crayfish (*Faxonius virilis*) may

still be commercially sold in the State for live bait, all other live crayfishes can be imported, sold, or purchased in Missouri only for the purposes of human consumption or as food for captive animals kept by authorized entities (for example, research institutions/agencies, publicly owned zoos) (Missouri Code of State Regulations 2018b, pp. 6–7). This regulation effectively bans the sale and purchase of live crayfish for bait, the import and sale of live crayfishes in pet stores, and the purchase and import of live crayfishes by schools for classroom study, all of which are vectors for crayfish invasions. It is also illegal in Missouri to release any baitfish or crayfish into public waters, except as specifically permitted by the MDC (Missouri Code of State Regulations 2018a, p. 3). These regulations may help reduce the likelihood of future invasions of nonnative crayfishes within the Upper St. Francis River watershed. However, as the woodland crayfish has already been introduced at several locations in the watershed and the regulations will not affect the inevitable spread of that species within the Upper St. Francis River watershed.

Approximately 41 percent of the Upper St. Francis River watershed is in Federal and State ownership, with the majority managed by the U.S. Forest Service as part of the Mark Twain National Forest. The U.S. Forest Service’s management efforts benefit stream health by focusing on riparian protection and control and reduction of sediment entering streams. Other major public landowners in the watershed include the MDC, the U.S. Army Corps of Engineers, and the Missouri Department of Natural Resources. Additionally, 5.3 rmi (8.5 km) of Big Creek is designated an “Outstanding State Resource Water.” Missouri Outstanding State Resource Waters are high-quality waters with significant aesthetic, recreational, or scientific value and receive special protection

against degradation in quality (Missouri Code of State Regulations 2018c, pp. 14, 16). These protections help maintain water quality and minimize additional sedimentation; therefore, these protections may improve the quantity and quality of habitat of the Big Creek crayfish and St. Francis River crayfish.

The EPA has conducted, and has plans to continue, extensive remediation efforts in areas of southeastern Missouri impacted by lead mining, including the Upper St. Francis River watershed. These efforts include sediment, soil, and mine waste removal. The EPA also has funded the development of a watershed master plan for the Little St. Francis River, located in the upper end of the watershed. This plan will identify sources of pollution (related to lead mining) and measures to reduce the pollution.

Current Condition of Species

To evaluate the current (and future viability) of the Big Creek crayfish and the St. Francis River crayfish, we assessed a range of conditions to allow us to consider the species' resiliency, representation, and redundancy. For the purposes of this assessment, populations were delineated using known locations and expanded to a subwatershed scale. As previously stated, we scaled down to a subpopulation level for analytical purposes, as both species have a limited number of populations. In the case of the St. Francis River crayfish, population-level ecology is also species-level ecology because genetic analyses indicate the entire species exists as a single population. Scaling down to the subpopulation level allowed us to better represent and compare groups of individuals at a finer scale. A summary of the current condition of each species is given at the end of this section (Table 1 and Table 2).

The Big Creek crayfish and St. Francis River crayfish currently occur in 16 subwatersheds. In 2008, it was estimated that the woodland crayfish occupied 103 to 403 rmi (166 to 649 km) or 5 to 20 percent of the total 2,004 rmi (3,225 km) in the Upper St. Francis River watershed (DiStefano and Westhoff 2011, p. 40). Based on known locations of the woodland crayfish, we know that 5 of the 16 Big Creek crayfish subwatersheds have been invaded (31 percent) and 4 of the 16 St. Francis River subwatersheds have been invaded (25 percent). We also know that the invasion has resulted in extirpation of the Big Creek crayfish in 9.1 rmi (14.7 km) and of the St. Francis River crayfish in 8.5 rmi (13.7 stream km) (Figure 3). This is likely a sizable underestimate of the actual extent of both range contractions, given that data for known native range contractions represent conditions in only 2 of the 11 streams known to be invaded by the woodland crayfish (the range contractions for each species occurred in different streams).

In addition, the known locations of the woodland crayfish depicted in Figure 3 are likely an under-representation of where the species is present in the watershed given that 1) the majority of locations were documented prior to 2010, 2) the species can expand at a rate as high as 745 yards (y) per year (681 m per year) in the upstream direction and 2,499 y per year (2,285 m year) in the downstream direction (DiStefano and Westhoff 2011, pp. 38, 40) and 3) the woodland crayfish has already been introduced at several locations throughout the watershed and has likely been introduced at additional, undocumented locations (it is not feasible to survey every stream throughout the watershed). Finally, there is currently no means to slow or stop the spread of the woodland crayfish.

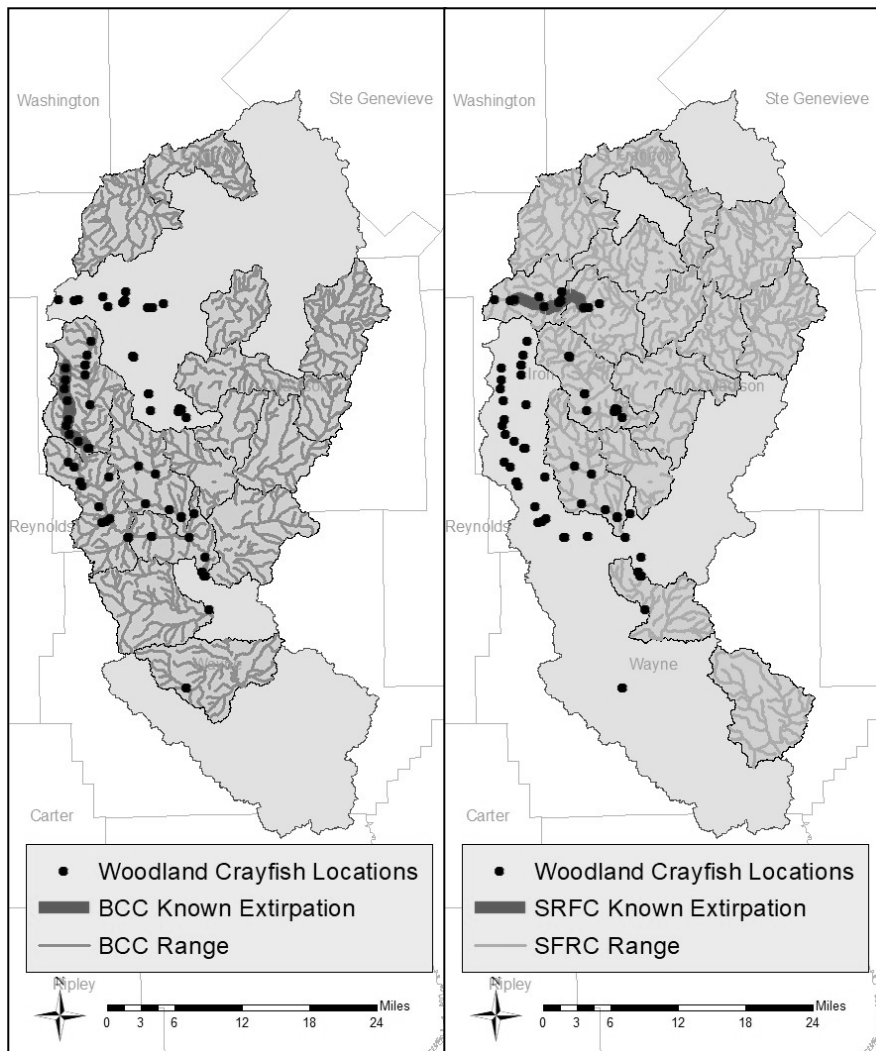


Figure 3. Known locations (as of 2018) of the Woodland Crayfish and stream segments from which the Big Creek Crayfish (BCC; left) and St. Francis River Crayfish (SFRC; right) have been extirpated due to the Woodland Crayfish invasion.

To evaluate the current condition of the Big Creek crayfish and St. Francis River crayfish in terms of the 3Rs, we reviewed available information on health of the subpopulations and queried species experts on the species' representation and redundancy. The full explanation of this analysis can be found in the SSA report; a summary of our conclusions is given below.

Resiliency

Although the Twelvemile Creek population of the Big Creek crayfish has not been invaded by the woodland crayfish, the woodland crayfish has been documented at 30 locations within the Main population, with 5 of the 14 (36 percent) of the population's subwatersheds invaded. Based on the Big Creek crayfish's range contractions and the rate at which the woodland crayfish can expand, we expect that range contractions are happening throughout the other invaded subwatersheds. We also conclude that it is likely that St. Francis River crayfish abundance in the Main population has been substantially reduced from heavy metal contamination given that 208 rmi (335 km) of the 940 rmi (1,514 km), or 22 percent, of the population occurs in areas with heavy metal surface contamination. Studies conducted in nearby watersheds demonstrate that heavy metal contamination reduces abundance. These impacts have reduced resiliency of the Main population and thus resiliency of the Big Creek crayfish has been reduced.

Four of the 16 subwatersheds occupied by the St. Francis River crayfish (25 percent) have been invaded by the woodland crayfish. Similar to the Big Creek crayfish, we expect that contractions of the St. Francis River crayfish are occurring in these areas based on range contractions documented elsewhere and the rate at which the woodland crayfish can expand. Resiliency of the St. Francis River crayfish has been further reduced due to impacts from heavy metal contamination, with 16 percent of the range occurring in areas with heavy metal contamination.

The narrow ranges of both the Big Creek crayfish and St. Francis River crayfish also inherently make them vulnerable to environmental variation and stochastic events that could affect their entire range (for example, extreme drought or flooding).

Representation

We consider Big Creek crayfish representation as having healthy subpopulations in both the Twelvemile Creek population and the Main population, to maintain the full breadth of adaptive diversity (and, thus, adaptive capacity). There appears to be gene flow throughout most of the Big Creek crayfish's range (Fetzner and DiStefano 2008, p. 12). However, the Big Creek crayfish in the Twelvemile Creek population contain unique haplotypes (a group of alleles that are inherited from a single parent) that were not found anywhere else in the watershed (Fetzner and DiStefano 2008, p. 12). Although the Twelvemile Creek population is currently not impacted by the woodland crayfish, the range of the Main population has been reduced due to woodland crayfish invasion, with 36 percent of the subwatersheds invaded (Table 1 and Table 2). Therefore, the species may have lost some level of representation. For the St. Francis River crayfish, we consider representation as having multiple, healthy subpopulations distributed across the range of the species to maintain the breadth of adaptive diversity (that is, throughout its range in the Upper St. Francis River watershed). Similar to the Big Creek crayfish, some level of representation of the St. Francis River crayfish may have been lost due to documented and undocumented range contractions, with 4 of the 16 (25 percent) of the St. Francis River subwatersheds invaded.

Redundancy

For the purposes of the SSA, we define a catastrophic event as a biotic or abiotic event that causes significant impacts at the population level such that the population cannot rebound from the effects or the population becomes highly vulnerable to normal population fluctuations or stochastic events.

Based on expert input (further described in the SSA report), we do not consider extreme drought or chemical spills as catastrophic events that are likely to have substantial effects on the Big Creek crayfish and St. Francis River crayfish. While these events may not cause a devastating impact to the entire Big Creek crayfish or St. Francis River crayfish populations, the occurrence of extreme droughts or chemical spills would reduce resiliency of the species by potentially extirpating or compromising subpopulations throughout the impacted area (see chapter 3 of the SSA report). However, both species are inherently vulnerable to extreme events or large-scale stressors given their small range, and there has been some reduction of in-population redundancy due to the extirpation of individuals (and subpopulations) in some areas because of woodland crayfish invasion.

Table 1. Summary of Big Creek crayfish's current condition.

	Assessment of Current Condition
Currently Occupied Stream Distance	Occurs in approximately 983 rmi (1,581 km) within 16 subwatersheds. However, this does not account for documented and undocumented range contractions that we expect are occurring in 31 percent of the species' subwatersheds due to the woodland crayfish invasion. In addition, 86 rmi (139 km) of stream reaches are likely occupied intermittently by the species due to movement among occupied watersheds.
Health of Subpopulations	In areas invaded by the woodland crayfish (31 percent of occupied subwatersheds), abundance is substantially reduced, with the species completely extirpated in some invaded areas. In areas impacted by lead mining contamination (22 percent of the range), abundance is also likely reduced. In areas not invaded by the woodland crayfish or impacted by lead mining contamination, we presume subpopulations are healthy.
Health of Populations	We presume the Twelvemile Creek population is currently healthy because it does not appear that the woodland crayfish has invaded the population and the population is outside of the area of lead mining contamination. The health of the Main population, however, has been impacted due to documented and undocumented range contractions from the woodland crayfish invasion in 36 percent of the population's subwatersheds. Abundance has also likely been reduced in 22 percent of the Main population due to heavy metal contamination.
Resiliency	Reduced due to documented and undocumented range contractions in 31 percent of the Big Creek crayfish's subwatersheds and expected reduced abundance in 22 percent of the range due to heavy metal contamination.
Representation	Somewhat reduced ecological diversity due to documented and undocumented range contractions in 25 percent of the Big Creek crayfish's subwatersheds.
Redundancy	Somewhat reduced due to documented and undocumented range contractions in 36 percent of subwatersheds in the Main population. The species is also inherently vulnerable to some extreme events given its small range. However, both populations of the species have a high level of redundancy relative to extreme events that affect areas downstream of the source of the event (for example, chemical spills) due to the number of tributaries that they occupy that would not be downstream of the event.

Table 2. Summary of St. Francis River crayfish's current condition.

	Assessment of Current Condition
Currently Occupied Stream Distance	Occurs in approximately 944 rmi (1,519 km) within 16 subwatersheds. However, this does not account for documented and undocumented range contractions that we expect are occurring in 25 percent of the species' subwatersheds due to the woodland crayfish invasion. In addition, 99 rmi (159 km) of stream reaches are likely occupied intermittently by the species due to movement among occupied watersheds.
Health of Subpopulations	In areas invaded by the woodland crayfish (25 percent of occupied subwatersheds), abundance is substantially reduced, with the species completely extirpated in some invaded areas. In areas impacted by lead mining contamination (16 percent of the range), abundance is also likely reduced. In areas not invaded by the woodland crayfish or impacted by lead mining contamination, we presume subpopulations are healthy.
Resiliency	Reduced due to documented and undocumented range contractions in 25 percent of the St. Francis River crayfish's subwatersheds. Also reduced due to reduced abundance in 16 percent of the range due to heavy metal contamination.
Representation	Somewhat reduced ecological diversity due to documented and undocumented range contractions in 25 percent of the St. Francis River crayfish's subwatersheds.
Redundancy	Somewhat reduced due to documented and undocumented range contractions in 25 percent of the St. Francis River crayfish's subwatersheds. The species is also inherently vulnerable to some extreme events given the species' small range, and there has been some reduction in redundancy due to reduction of the range. However, the species have a high level of redundancy relative to extreme events that affect areas downstream of the source of the event (for example, chemical spills) due to the number of tributaries that they occupy that would not be downstream of the event.

Future Scenarios

For the purpose of this assessment, we define viability as the ability of the species to sustain populations in the wild over time. To evaluate future conditions of the Big Creek crayfish and St. Francis River crayfish, we predicted the expansion of the nonnative woodland crayfish within the ranges of the native crayfishes. We asked biologists with expertise on crayfishes to estimate the future expansion rate in the Upper St. Francis River watershed, the impact on Big Creek crayfish and St. Francis River crayfish abundances, and the length of time for those impacts to be fully realized. A full description of the expert elicitation meeting methodology and results are available in the SSA report (Service 2018, pp. 36–47 & 64–70). As a way to characterize uncertainty in predicting future conditions and to capture the entire breadth of plausible future conditions, we developed “reasonable best,” “reasonable worst,” and “most likely” scenarios that represent the plausible range of the Big Creek crayfish’s and St. Francis River crayfish’s future conditions (see Table 3, below). Each of the scenarios is based on the expert-elicited estimates of the woodland crayfish’s expansion rates, impacts of the invasion, and time for impacts to be fully realized. For each of the scenarios, we predicted the extent of future expansion of the woodland crayfish at 10, 25, and 50 years into the future. We then calculated the extent of the Big Creek crayfish’s and St. Francis River crayfish’s ranges that would be affected under each scenario and described effects to abundance based on the experts’ projections. Because we used a finer scale data, we present results in river miles invaded, rather than subwatersheds invaded (as we did to assess current conditions). Additional details on the expert elicitation and a summary of results can be found in appendix B of the SSA report. Below is a summary of the results

from the SSA; for further details on the methods, assumptions, and results, see chapter 5 of the SSA report. A summary of predicted impacts in 50 years for both species is summarized in Tables 4 and 5 below.

Table 3. Explanation of scenarios used to predict the future condition of Big Creek Crayfish and St. Francis River Crayfish.

Scenario	Estimates Used
Reasonable Best	<ul style="list-style-type: none"> • Lowest plausible expansion rate of the woodland crayfish • Lowest level of predicted impact on abundance of Big Creek crayfish and St. Francis River crayfish • Highest number of years for impacts to be fully realized
Reasonable Worst	<ul style="list-style-type: none"> • Highest plausible expansion rate of the woodland crayfish • Highest level of predicted impact on abundance of Big Creek crayfish and St. Francis River crayfish • Lowest number of years for impacts to be fully realized
Most Likely	<ul style="list-style-type: none"> • Most likely expansion rate of the woodland crayfish • Most likely level of predicted impact on abundance of Big Creek crayfish and St. Francis River crayfish • Most likely number of years for impacts to be fully realized

Big Creek Crayfish

Under the “reasonable best” scenario, we expect the woodland crayfish invasion will expand to 25 percent of the Big Creek crayfish Main population in 10 years, constituting 24 percent of the species’ range. In 25 years, 35 percent of the Big Creek crayfish Main population will have been invaded, constituting 33 percent of the species’ range. In 50 years, 49 percent of the Main population will be invaded, constituting 46 percent of the species’ range. The Twelvemile Creek population is not predicted to be invaded in 25 or 50 years under this scenario. In areas invaded by the woodland crayfish, abundance is predicted to be reduced by over 50 percent in 10 to 20 years.

Under the “reasonable worst” scenario, we expect 44 percent of the Main population and 0.2 percent of the Twelvemile Creek population will be invaded by the woodland crayfish in 10 years, constituting 42 percent of the Big Creek crayfish’s total range. In 25 years, 70 percent of the Main population and 81 percent of the Twelvemile Creek population will be invaded by the woodland crayfish, constituting 70 percent of the Big Creek crayfish’s total range. In 50 years, 90 percent of the Main population and 100 percent of the Twelvemile Creek population will be invaded, constituting 91 percent of the species’ range. In areas invaded by the woodland crayfish, abundance is predicted to be reduced by approximately 100 percent (that is, extirpation) in less than 10 years.

Under the “most likely” scenario, we expect 28 percent of the Big Creek crayfish Main population will be invaded by the woodland crayfish in 10 years, constituting 27 percent of the species’ range. In 25 years, 44 percent of the Main population and 6 percent of the Twelvemile Creek population will be invaded by the woodland crayfish, constituting 42 percent of the Big Creek crayfish’s total range. In 50 years, 64 percent of the Main population and 56 percent of the Twelvemile Creek population will be invaded, constituting 64 percent of the species’ range. In areas invaded by the woodland crayfish, abundance will be reduced by approximately 100 percent (that is, extirpation) in less than 10 years.

Given that there are currently no known feasible measures to curtail the woodland crayfish invasion for the long term, we consider it extremely likely that the invasion will continue. Based on our use of expert-elicited estimates of the rate of expansion and the resulting impacts on the Big Creek crayfish, we are also reasonably certain that we can predict the plausible range of future conditions within 50 years. Here, we discuss the

species' future condition in terms of the next 50 years (Summarized below in Table 4.); 10- and 25-year future conditions are discussed (beyond what was stated above) in the SSA report. As previously stated, resiliency of the Big Creek crayfish has already been reduced from historical conditions due to range contractions in 31 percent of occupied subwatersheds caused by invasion of the woodland crayfish. Resiliency also has likely been reduced due to lead mining contamination in 22 percent of the crayfish's range. Using the modeling results (that represent the range of all future scenarios), we predict that within 50 years resiliency of the species will continue to be reduced due to a 50 to 100 percent reduction in abundance in 49 to 90 percent of the Main population and 0 to 100 percent of the Twelvemile Creek population. In addition, if other threats (aside from woodland crayfish invasion and lead mining contamination) such as drought, flood events, disease, and degraded water quality, remain the same or increase, resiliency will be further reduced by these threats. Thus, our modeled results represent the minimum amount of the species' range that is expected to be impacted within 50 years because the decline in resiliency only considers impacts of the woodland crayfish invasion and none of the other stressors mentioned above that affect the Big Creek crayfish.

We predict that the Big Creek crayfish will continue to lose ecological diversity, given the expected expansion of the woodland crayfish and the resulting impact on subpopulations in both the Main and Twelvemile Creek populations. Both populations are expected to experience a 50 to 100 percent reduction in abundance in invaded areas. For the Twelvemile Creek population, in 50 years there may be as much as 100 percent of the population's range invaded, whereas up to 90 percent of the Main population's range may be invaded in the same time. Given the unique haplotypes contained in the

Twelvemile Creek population, the reduced abundance of subpopulations in the majority of that population, or especially the complete loss of that population, would represent an appreciable reduction in the species' representation.

The Big Creek crayfish is inherently vulnerable to extreme events and other stressors, given the species' small range. There has been already been some reduction in redundancy due to documented and undocumented range contractions in 36 percent of subwatersheds in the Main population. Based on results of the future scenario modeling, we expect that within 50 years, redundancy of the Big Creek crayfish will be further reduced by the predicted 50 to 100 percent reduction in abundance in 49 to 90 percent of the range of the Main population and 0 to 100 percent of the range of the Twelvemile Creek population. Because the Twelvemile Creek population consists of only one subwatershed, it will be more vulnerable to extreme events if multiple sub-tributaries are impacted by the woodland crayfish invasion.

St. Francis River Crayfish

Under the "reasonable best" scenario, we expect 12 percent of the St. Francis River crayfish's range will be invaded by the woodland crayfish in 10 years. In 25 years, 21 percent of the range will have been invaded, and 33 percent of the range will have been invaded in 50 years. In areas where the woodland crayfish has invaded, abundance is predicted to be reduced by over 10 to 50 percent in 30 to 40 years.

Under the "reasonable worst" scenario, we expect 30 percent of the St. Francis River crayfish's range will be invaded by the woodland crayfish in 10 years. In 25 years, 56 percent of the range will have been invaded, and 81 percent of the range will have been invaded in 50 years. In areas where the woodland crayfish has invaded, abundance

is predicted to be reduced by approximately 100 percent (that is, extirpation) in less than 10 years.

Under the “most likely” scenario, we expect 18 percent of the St. Francis River crayfish’s range will be invaded by the woodland crayfish in 10 years. In 25 years, 32 percent of the range will have been invaded, and 50 percent of the range will have been invaded in 50 years. In areas where the woodland crayfish has invaded, abundance is predicted to be reduced by 50 to 100 percent in 10 to 30 years (Table 5).

Similar to the Big Creek crayfish, we are also reasonably certain that we can predict the plausible range of future conditions for the St. Francis River crayfish within 50 years because there are no known feasible measures to curtail the spread of the woodland crayfish. Here, we discuss the species’ future condition over the next 50 years; 10- and 25-year future conditions are discussed (beyond what was stated above) in the SSA report. As previously stated, resiliency of the St. Francis River crayfish has already been reduced from historical conditions due to effects of the woodland crayfish invasion in 25 percent of subwatersheds occupied by the St. Francis River crayfish and also from lead mining contamination in 22 percent of the species’ range. Based on the modeling results (the range of all future scenarios), we predict that resiliency of the species will continue to be reduced due to the woodland crayfish invasion and resulting 10 to 100 percent reduction in abundance in an estimated 33 to 81 percent of the range within 50 years. If threats other than the woodland crayfish and lead mining contamination, such as drought, flood events, disease and degraded water quality remain the same or increase, resiliency will be further reduced. Like the Big Creek crayfish, our modeled results represent the minimum amount of the species’ range that is expected to be impacted

within 50 years because the decline in resiliency only considers impacts of the woodland crayfish invasion and none of the other stressors mentioned above that affect the St. Francis River crayfish.

There has already been some loss in St. Francis River crayfish's representation due to the loss of the subpopulations (and therefore ecological diversity) impacted by the woodland crayfish invasion and impacts of lead mining contamination. The reduction in representation is expected to continue given the predicted 10 to 100 percent reduction in abundance in 33 to 81 percent of the species' range, based on the results of all future scenarios.

The St. Francis River crayfish is inherently vulnerable to extreme events and stressors, given the species' small range and single population, and there has been some reduction in redundancy due to range reduction and reduced abundance of subpopulations due to the woodland crayfish invasion and lead mining contamination. Similar to representation, we expect that redundancy of the St. Francis River crayfish will be further reduced by the predicted 10 to 100 percent reduction in abundance in 33 to 81 percent of the species' range within 50 years as more tributaries are invaded and subpopulations are extirpated.

Table 4. The range of predicted impacts to the Big Creek crayfish from the woodland crayfish at 50 years based on expert input.

	Reasonable Best	Most Likely	Reasonable Worst
Percent of Main population invaded	48.7 percent	64.1 percent	90.4 percent
Percent of Twelvemile Creek population invaded	0 percent	55.6 percent	100 percent
Percent of total range invaded	46.2 percent	63.7 percent	90.9 percent
Percent reduction in abundance in invaded areas	>50 percent	~100 percent	~100 percent

Table 5. The range of predicted impacts to the St. Francis River crayfish from the woodland crayfish at 50 years based on expert input.

	Reasonable Best	Most Likely	Reasonable Worst
Percent of range invaded	33.2 percent	49.5 percent	81.0 percent
Percent reduction in abundance in invaded areas	10 to 50 percent	50 to 100 percent	~100 percent

Determination

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of “endangered species” or “threatened species.” The Act defines an “endangered species” as a species that is “in danger of extinction throughout all or a significant portion of its range,” and a “threatened species” as a species that is “likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” The Act requires that we determine whether a species meets the definition of

“endangered species” or “threatened species” because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence.

Status Throughout All of Its Range

Both Big Creek crayfish and the St. Francis River crayfish face threats from nonnative crayfish invasion (Factor E), declines in water quality (due to lead mining, sedimentation, etc.) (Factor A), and extreme events (drought, chemical spill, or both) (Factors A and E). There are no existing regulatory mechanisms that are adequate to reduce these threats to a level that the species do not warrant listing (Factor D). Given current and future decreases in resiliency, populations will become more vulnerable to extirpation from stochastic events, thereby resulting in concurrent losses in representation and redundancy. The range of plausible future scenarios for the Big Creek crayfish and the St. Francis River crayfish suggests significant reductions in viability into the future.

In 2008, the woodland crayfish, which is not native to the Upper St. Francis River watershed, was estimated to occupy between 103 and 403 rmi (166 to 649 km, or 5 to 20 watershed. Based on known locations of the woodland crayfish, we know that 5 of the 16 Big Creek crayfish subwatersheds have been invaded (31 percent) and 4 of the 16 St. Francis River subwatersheds have been invaded (25 percent). We also know that the invasion has resulted in extirpation of the Big Creek crayfish in 9.1 rmi (14.7 km) and of the St. Francis River crayfish in 8.5 rmi (13.7 stream km). This is likely a sizable underestimate of the actual extent of both range contractions, given that this represents

conditions in only 2 of the 11 streams known to be invaded by the woodland crayfish (the range contractions for each species occurred in different streams). In addition, the known locations of the woodland crayfish are likely an under-representation of where the species is present in the watershed given that 1) the majority of locations were documented prior to 2010, 2) the species can expand at a rate as high as 745 yards (y) per year (681 m per year) in the upstream direction and 2,499 y per year (2,285 m year) in the downstream direction (DiStefano and Westhoff 2011, pp. 38, 40); and 3). The woodland crayfish has already been introduced at several locations throughout the watershed, has likely been introduced at additional, undocumented locations (it is not feasible to survey every stream throughout the watershed) and the invasion has likely progressed since the development of the SSA report and this proposed rule. There is currently no means to slow or stop the spread of the woodland crayfish.

Our analysis of the Big Creek crayfish's and the St. Francis River crayfish's current and future conditions based on the increasing threat of the woodland crayfish invasion and the continuing threat of contamination, as well as the consideration of conservation efforts discussed above, show that the viability for both the Big Creek crayfish and the St. Francis River crayfish will continue to decline such that they are likely to become in danger of extinction throughout all of their ranges within the foreseeable future.

First, we considered whether these species are presently in danger of extinction and determined that proposing endangered status is not appropriate. The current conditions as assessed in the SSA show that the species exist throughout most of their historical ranges and the nonnative woodland crayfish has only displaced a small portion

of both species' in their ranges. Although representation has declined in some small amount, ecological diversity (and, therefore, adaptive capacity) likely remains at a level that is currently adequate. Redundancy has also slightly declined since historical conditions, in that there has been a reduction in subpopulations, but we do not believe it has declined significantly. In short, while the primary threats are currently acting on the species and many of those threats are expected to continue into the future, we did not find that either species is currently in danger of extinction throughout all of its range. However, according to our assessment of the plausible future scenarios, both species are likely to become endangered species in the foreseeable future throughout all of their ranges.

The range of plausible future scenarios of the Big Creek crayfish and St. Francis River crayfish suggests reduced viability into the future. Under the "most likely" scenarios for both species, resiliency is expected to decline dramatically within 50 years, given that over 50 percent of the species' ranges are predicted to be invaded by the woodland crayfish. As additional subpopulations become extirpated, this expected reduction in both the number and distribution of healthy (and thus resilient) subpopulations is likely to make the species vulnerable to extreme disturbances and environmental and demographic stochasticity.

Thus, after assessing the best available information, we determine that Big Creek crayfish and St. Francis River crayfish are not currently in danger of extinction, but are likely to become in danger of extinction within the foreseeable future, throughout all of their range.

Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. The court in *Center for Biological Diversity v. Everson*, 2020 WL 437289 (D.D.C. Jan. 28, 2020) (*Everson*), vacated the aspect of the 2014 Significant Portion of its Range Policy that provided that the Services do not undertake an analysis of significant portions of a species' range if the species warrants listing as threatened throughout all of its range. Therefore, we proceed to evaluating whether the species is endangered in a significant portion of its range—that is, whether there is any portion of the species' range for which both (1) the portion is significant; and, (2) the species is in danger of extinction in that portion. Depending on the case, it might be more efficient for us to address the “significance” question or the “status” question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species' range.

Following the court's holding in *Everson*, we now consider whether there are any significant portions of the species' range where the species is in danger of extinction now (i.e., endangered). In undertaking this analysis for Big Creek crayfish and St. Francis River crayfish, we choose to address the status question first—we consider information pertaining to the geographic distribution of both the species and the threats that the species faces to identify any portions of the range where the species is endangered.

The statutory difference between an endangered species and a threatened species is the time horizon in which the species becomes in danger of extinction; an endangered species is in danger of extinction now while a threatened species is not in danger of extinction now but is likely to become so in the foreseeable future. Thus, we considered the time horizon for the threats that are driving the Big Creek crayfish and the St. Francis River crayfish to warrant listing as a threatened species throughout all of its range. We examined the following threats: nonnative crayfish invasion (Factor E), declines in water quality (due to lead mining, sedimentation, etc.) (Factor A), extreme events (drought, chemical spill, or both) (Factors A and E), and including cumulative effects. There are no existing regulatory mechanisms that are adequate to reduce these threats to a level that the species do not warrant listing (Factor D).

The best scientific and commercial data available indicate that the time horizon on which the species' responses to the above-cited threats are likely to occur is the foreseeable future, not the present or immediate future. In addition, the best scientific and commercial data available do not indicate that any of the species' responses to those threats are more immediate in any portions of the species' range. Therefore, we determine that the Big Creek crayfish and the St. Francis River crayfish are not in danger of extinction now in any portion of their range, but that the species are likely to become in danger of extinction within the foreseeable future throughout all of their range. This is consistent with the courts' holdings in *Desert Survivors v. Department of the Interior*, No. 16-cv-01165-JCS, 2018 WL 4053447 (N.D. Cal. Aug. 24, 2018), and *Center for Biological Diversity v. Jewell*, 248 F. Supp. 3d , 946, 959 (D. Ariz. 2017).

Determination of Status

Our review of the best available scientific and commercial information indicates that the Big Creek crayfish and the St. Francis River crayfish meet the definition of threatened species. Therefore, we propose to list the Big Creek crayfish and the St. Francis River crayfish as threatened species throughout all of its range in accordance with sections 3(20) and 4(a)(1) of the Act.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened species under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness and conservation by Federal, State, Tribal, and local agencies; private organizations; and individuals. The Act encourages cooperation with the States and other countries and calls for recovery actions to be carried out for listed species. The protection required by Federal agencies and the prohibitions against certain activities are discussed, in part, below.

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Subsection 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery.

The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

Recovery planning includes the development of a recovery outline shortly after a species is listed and preparation of a draft and final recovery plan. The recovery outline guides the immediate implementation of urgent recovery actions. Revisions of the recovery plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan also identifies recovery criteria for review of when a species may be ready for reclassification from endangered to threatened (“downlisting”) or removal from the List of Endangered and Threatened Wildlife or Plants (“delisting”), and for measuring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. When completed, the recovery outlines, draft recovery plans, and the final recovery plans will be available on our website (<http://www.fws.gov/endangered>), or from our Columbia, Missouri Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (for example, restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands. If these species are

listed, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the State of Missouri would be eligible for Federal funds to implement management actions that promote the protection or recovery of the Big Creek crayfish and the St. Francis River crayfish. Information on our grant programs that are available to aid species recovery can be found at: <http://www.fws.gov/grants>.

Although the Big Creek crayfish and St. Francis River crayfish are only proposed for listing under the Act at this time, please let us know if you are interested in participating in conservation efforts for these species. Additionally, we invite you to submit any new information on these species whenever it becomes available and any information you may have for conservation planning purposes (see **FOR FURTHER INFORMATION CONTACT**).

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as an endangered or threatened species and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may

affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service.

Federal agency actions within the species' habitat that may require conference or consultation or both as described in the preceding paragraph may include, but are not limited to, management and any other landscape-altering activities on Federal lands administered by the Service, U.S. Forest Service, or National Park Service; issuance of section 404 Clean Water Act (33 U.S.C. 1251 *et seq.*) permits by the U.S. Army Corps of Engineers; and construction and maintenance of roads or highways by the Federal Highway Administration.

II. Proposed Rule Issued Under Section 4(d) of the Act for the Big Creek Crayfish and the St. Francis River Crayfish

Background

Section 4(d) of the Act states that the “Secretary shall issue such regulations as he deems necessary and advisable to provide for the conservation” of species listed as threatened. The U.S. Supreme Court has noted that very similar statutory language demonstrates a large degree of deference to the agency (see *Webster v. Doe*, 486 U.S. 592 (1988)). Conservation is defined in the Act to mean “the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to [the Act] are no longer necessary” (16 U.S.C. 1532(3)). Additionally, section 4(d) of the Act states that the Secretary “may by regulation prohibit with respect to any threatened species any act prohibited under [section 9(a)(1)] . . . or [section 9(a)(2)].” Thus, regulations promulgated under section 4(d) of the Act provide the Secretary with wide latitude of discretion to select appropriate

provisions tailored to the specific conservation needs of the threatened species. The statute grants particularly broad discretion to the Service when adopting the prohibitions under section 9.

The courts have recognized the extent of the Secretary's discretion under this standard to develop rules that are appropriate for the conservation of a species. For example, courts have approved rules developed under section 4(d) that include a taking prohibition for threatened wildlife, or include a limited taking prohibition (see *Alsea Valley Alliance v. Lautenbacher*, 2007 U.S. Dist. Lexis 60203 (D. Or. 2007); *Washington Environmental Council v. National Marine Fisheries Service*, 2002 U.S. Dist. Lexis 5432 (W.D. Wash. 2002)). Courts have also approved 4(d) rules that do not address all of the threats a species faces (see *State of Louisiana v. Verity*, 853 F.2d 322 (5th Cir. 1988)). As noted in the legislative history when the Act was initially enacted, "once an animal is on the threatened list, the Secretary has an almost infinite number of options available to him with regard to the permitted activities for those species. He may, for example, permit taking, but not importation of such species," or he may choose to forbid both taking and importation but allow the transportation of such species, as long as the prohibitions, and exceptions to those prohibitions, will "serve to conserve, protect, or restore the species concerned in accordance with the purposes of the Act" (H.R. Rep. No. 412, 93rd Cong., 1st Sess. 1973).

The Service has developed a species-specific 4(d) rule that is designed to address the Big Creek crayfish's and the St. Francis River crayfish's specific threats and conservation needs. Although the statute does not require the Service to make a "necessary and advisable" finding with respect to the adoption of specific prohibitions

under section 9, we find that this 4(d) rule is necessary and advisable to provide for the conservation of the Big Creek crayfish and the St. Francis River crayfish. As discussed above under **Summary of Biological Status and Threats**, the Service has concluded that the Big Creek crayfish and the St. Francis River crayfish are at risk of extinction within the foreseeable future primarily due to the spread of invasive species and degraded water quality. The provisions of this proposed 4(d) rule would promote conservation of the Big Creek crayfish and the St. Francis River crayfish by discouraging the spread of the woodland crayfish (and other invasive species) and encouraging management of the landscape in ways that meet land management considerations while meeting the conservation needs of the Big Creek crayfish and the St. Francis River crayfish. The provisions of this proposed 4(d) rule are one of many tools that the Service would use to promote the conservation of the Big Creek crayfish and the St. Francis River crayfish. This proposed 4(d) rule would apply only if and when the Service makes final the listing of the Big Creek crayfish and the St. Francis River crayfish as threatened species.

Provisions of the Proposed 4(d) Rule

As outlined in the regulatory text later in this proposed rule this proposed 4(d) (special) rule would provide for the conservation of the Big Creek crayfish and the St. Francis River crayfish by prohibiting the following activities, except as otherwise authorized or permitted: Import or export; take; possession and other acts with unlawfully taken specimens; delivery, receipt, transport, or shipment in interstate or foreign commerce in the course of commercial activity; and sale or offer for sale in interstate or foreign commerce.

As discussed above under **Summary of Biological Status and Threats**, the spread of nonnative crayfish (Factor E) and declines in water quality (due to mining, sedimentation, etc.) (Factor A) are affecting the status of the Big Creek crayfish and the St. Francis River crayfish. A range of activities have the potential to impact these species, including, but not limited to: Recreational activities that promote the spread of the woodland crayfish; mining (heavy metal and gravel); wastewater effluent discharge; agricultural activities; construction of low-water crossings and bridge construction; and destruction of bank habitat that increases rates of sedimentation. Regulating these activities would help preserve these species, slow their rate of decline, and decrease synergistic, negative effects from other stressors.

In section 3 of the Act, “take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Some of these provisions have been further defined in regulation at 50 CFR 17.3. Take can result knowingly or otherwise, by direct and indirect impacts, intentionally or incidentally. Regulating incidental and intentional take would help discourage the spread of the woodland crayfish and would maintain or increase water quality to preserve the Big Creek crayfish and the St. Francis River crayfish, slow their rate of decline, and decrease synergistic, negative effects from other stressors.

We may issue permits to carry out otherwise prohibited activities, including those described above, involving threatened wildlife under certain circumstances. Regulations governing permits are codified at 50 CFR 17.32. With regard to threatened wildlife, a permit may be issued for the following purposes: For scientific purposes, to enhance propagation or survival, for economic hardship, for zoological exhibition, for educational

purposes, for incidental taking, or for special purposes consistent with the purposes of the Act. There are also certain statutory exemptions from the prohibitions, which are found in sections 9 and 10 of the Act.

The Service recognizes the special and unique relationship with our State natural resource agency partners in contributing to conservation of listed species. State agencies often possess scientific data and valuable expertise on the status and distribution of endangered, threatened, and candidate species of wildlife and plants. State agencies, because of their authorities and their close working relationships with local governments and landowners, are in a unique position to assist the Services in implementing all aspects of the Act. In this regard, section 6 of the Act provides that the Service shall cooperate to the maximum extent practicable with the States in carrying out programs authorized by the Act. Therefore, any qualified employee or agent of a State conservation agency that is a party to a cooperative agreement with the Service in accordance with section 6(c) of the Act, who is designated by his or her agency for such purposes, would be able to conduct activities designed to conserve the Big Creek crayfish and the St. Francis River crayfish that may result in otherwise prohibited take without additional authorization.

Additionally, this 4(d) rule also allows a person to take a Big Creek crayfish or a St. Francis River crayfish if that person is conducting research or education under a valid Missouri Department of Conservation Wildlife Collector's permit.

Along with State (and State sponsored) conservation efforts, a person may take, incidental to an otherwise lawful activity, a Big Creek crayfish or a St. Francis River crayfish during restoration activities or other activities that will result in an overall benefit to one or both of the species. Such activities include, but are not limited to,

remediation efforts by the Environmental Protection Agency and restoration efforts by the U.S. Forest Service, the Service's Natural Resource Damage Assessment Program or the Service's Partners for Fish and Wildlife Program.

Education and outreach are important conservation tools and it is neither necessary nor advisable for the conservation of the Big Creek crayfish or the St. Francis River crayfish to regulate educational efforts related to these species. Therefore, any person may capture a Big Creek crayfish or a St. Francis River crayfish for educational or observational purposes, provided that the crayfish is not removed from the site of capture.

Missouri's Wildlife Code allows for a combined total of 150 crayfish, freshwater shrimp and non-game fish to be collected daily as bait. Because invasion of the woodland crayfish is the primary threat to Big Creek crayfish and St. Francis River crayfish, the removal of individual native crayfish for use as bait is not expected to impact their overall status. Additionally, the native species are abundant in areas where the woodland crayfish has not yet invaded. Based on these facts, the Service (in coordination with the State of Missouri) has concluded that collection of these two species, as bait, should not be prohibited, so long as persons do not collect more than 25 of each crayfish species per day as outlined in the regulatory text below.

Our full proposed 4(d) rule for the Big Creek crayfish and the St. Francis River crayfish, including all of the prohibitions and exceptions to prohibitions we are proposing for these species, is provided below, under **Proposed Regulation Promulgation**.

Nothing in this proposed 4(d) rule would change in any way the recovery planning provisions of section 4(f) of the Act, the consultation requirements under section 7 of the Act, or the ability of the Service to enter into partnerships for the

management and protection of the Big Creek crayfish and the St. Francis River crayfish. However, interagency cooperation may be further streamlined through planned programmatic consultations for the species between Federal agencies and the Service. We ask the public, particularly State agencies and other interested stakeholders that may be affected by the proposed 4(d) rule, to provide comments and suggestions regarding additional guidance and methods that the Service could provide or use, respectively, to streamline the implementation of this proposed 4(d) rule (see **Information Requested**, above).

III. Proposed Critical Habitat Designation

Background

Critical habitat is defined in section 3 of the Act as:

(1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features

(a) Essential to the conservation of the species, and

(b) Which may require special management considerations or protection; and

(2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

Our regulations at 50 CFR 424.02 define the geographical area occupied by the species as: An area that may generally be delineated around species' occurrences, as determined by the Secretary (i.e., range). Such areas may include those areas used throughout all or part of the species' life cycle, even if not used on a regular basis (e.g.,

migratory corridors, seasonal habitats, and habitats used periodically, but not solely by vagrant individuals).

Conservation, as defined under section 3 of the Act, means to use and the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking.

Critical habitat receives protection under section 7 of the Act through the requirement that Federal agencies ensure, in consultation with the Service, that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Designation also does not allow the government or public to access private lands, nor does designation require implementation of restoration, recovery, or enhancement measures by non-Federal landowners. Where a landowner requests Federal agency funding or authorization for an action that may affect a listed species or critical habitat, the Federal agency would be required to consult with the Service under section 7(a)(2) of the Act. However, even if the Service were to conclude that the proposed activity would result in destruction or adverse modification of the critical habitat, the Federal action agency and the landowner are not required to abandon the proposed activity, or to restore

or recover the species; instead, they must implement “reasonable and prudent alternatives” to avoid destruction or adverse modification of critical habitat.

Under the first prong of the Act’s definition of critical habitat, areas within the geographical area occupied by the species at the time it was listed are included in a critical habitat designation if they contain physical or biological features (1) which are essential to the conservation of the species and (2) which may require special management considerations or protection. For these areas, critical habitat designations identify, to the extent known using the best scientific and commercial data available, those physical or biological features that are essential to the conservation of the species (such as space, food, cover, and protected habitat). In identifying those physical or biological features that occur in specific occupied areas, we focus on the specific features that are essential to support the life-history needs of the species, including but not limited to, water characteristics, soil type, geological features, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic, or a more-complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity.

Under the second prong of the Act’s definition of critical habitat, we can designate critical habitat in areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. When designating critical habitat, the Secretary will first evaluate areas occupied by the species. The Secretary will only consider unoccupied areas to be

essential where a critical habitat designation limited to geographical areas occupied by the species would be inadequate to ensure the conservation of the species. In addition, for an unoccupied area to be considered essential, the Secretary must determine that there is a reasonable certainty both that the area will contribute to the conservation of the species and that the area contains one or more of those physical or biological features essential to the conservation of the species.

Section 4 of the Act requires that we designate critical habitat on the basis of the best scientific data available. Further, our Policy on Information Standards Under the Endangered Species Act (published in the **Federal Register** on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106-554; H.R. 5658)), and our associated Information Quality Guidelines, provide criteria, establish procedures, and provide guidance to ensure that our decisions are based on the best scientific data available. They require our biologists, to the extent consistent with the Act and with the use of the best scientific data available, to use primary and original sources of information as the basis for recommendations to designate critical habitat.

When we are determining which areas should be designated as critical habitat, our primary source of information is generally the information from the SSA Report and information developed during the listing process for the species. Additional information sources may include any generalized conservation strategy, criteria, or outline that may have been developed for the species, the recovery plan for the species, articles in peer-reviewed journals, conservation plans developed by States and counties, scientific status

surveys and studies, biological assessments, other unpublished materials, or experts' opinions or personal knowledge.

Habitat is dynamic, and species may move from one area to another over time. We recognize that critical habitat designated at a particular point in time may not include all of the habitat areas that we may later determine are necessary for the recovery of the species. For these reasons, a critical habitat designation does not signal that habitat outside the designated area is unimportant or may not be needed for recovery of the species. Areas that are important to the conservation of the species, both inside and outside the critical habitat designation, will continue to be subject to: (1) conservation actions implemented under section 7(a)(1) of the Act, (2) regulatory protections afforded by the requirement in section 7(a)(2) of the Act for Federal agencies to ensure their actions are not likely to jeopardize the continued existence of any endangered or threatened species, and (3) section 9 of the Act's prohibitions on taking any individual of the species, including taking caused by actions that affect habitat. Federally funded or permitted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy findings in some cases. These protections and conservation tools will continue to contribute to recovery of this species. Similarly, critical habitat designations made on the basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans (HCPs), or other species conservation planning efforts if new information available at the time of these planning efforts calls for a different outcome.

Prudency Determination

Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12), require that, to the maximum extent prudent and determinable, the Secretary shall designate critical habitat at the time the species is determined to be an endangered or threatened species. Our regulations (50 CFR 424.12(a)(1)) state that the Secretary may, but is not required to, determine that a designation would not be prudent in the following circumstances:

(i) The species is threatened by taking or other human activity and identification of critical habitat can be expected to increase the degree of such threat to the species;

(ii) The present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or threats to the species' habitat stem solely from causes that cannot be addressed through management actions resulting from consultations under section 7(a)(2) of the Act;

(iii) Areas within the jurisdiction of the United States provide no more than negligible conservation value, if any, for a species occurring primarily outside the jurisdiction of the United States;

(iv) No areas meet the definition of critical habitat; or

(v) The Secretary otherwise determines that designation of critical habitat would not be prudent based on the best scientific data available.

As discussed above, there is currently no imminent threat of take attributed to collection or vandalism identified under Factor B for this species, and identification and mapping of critical habitat is not expected to initiate any such threat. In our SSA and proposed listing rule for the Big Creek crayfish and the St. Francis River crayfish, we determined that the present or threatened destruction, modification, or curtailment of

habitat or range is a threat to the Big Creek Crayfish and the St. Francis River crayfish and that those threats in some way can be addressed by section 7(a)(2) consultation measures. The species occurs wholly in the jurisdiction of the United States and we are able to identify areas that meet the definition of critical habitat. Therefore, because none of the circumstances enumerated in our regulations at 50 CFR 424.12(a)(1) have been met and because there are no other circumstances the Secretary has identified for which this designation of critical habitat would be not prudent we have determined that the designation of critical habitat is prudent for both the Big Creek crayfish and the St. Francis River crayfish.

Critical Habitat Determinability

Having determined that designation is prudent, under section 4(a)(3) of the Act we must then find whether critical habitat for both species is determinable. Our regulations at 50 CFR 424.12(a)(2) state that critical habitat is not determinable when one or both of the following situations exist:

- (i) Data sufficient to perform required analyses are lacking, or
- (ii) The biological needs of the species are not sufficiently well known to identify any area that meets the definition of “critical habitat.”

When critical habitat is not determinable, the Act allows the Service an additional year to publish a critical habitat designation (16 U.S.C. 1533(b)(6)(C)(ii)).

We reviewed the available information pertaining to the biological needs of both species and habitat characteristics where the species are located. We find that this information is sufficient for us to conduct both the biological and economic analyses required for the critical habitat determination. Therefore, we conclude that the

designation of critical habitat is determinable for the Big Creek crayfish and St. Francis River crayfish.

Physical or Biological Features Essential to the Conservation of the Species

In accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12(b), in determining which areas we will designate as critical habitat from within the geographical area occupied by the species at the time of listing, we consider the physical or biological features that are essential to the conservation of the species and that may require special management considerations or protection. The regulations at 50 C.F.R. 424.02 define “physical or biological features essential to the conservation of the species” as:

The features that occur in specific areas and that are essential to support the life-history needs of the species, including but not limited to, water characteristics, soil type, geological features, sites, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic, or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity.

For example, physical features essential to the conservation of the species might include gravel of a particular size required for spawning, alkali soil for seed germination, protective cover for migration, or susceptibility to flooding or fire that maintains necessary early-successional habitat characteristics. Biological features might include prey species, forage grasses, specific kinds or ages of trees for roosting or nesting, symbiotic fungi, or a particular level of nonnative species consistent with conservation needs of the listed species. The features may also be combinations of habitat characteristics and may encompass the relationship between characteristics or the necessary amount of a characteristic essential to support the life history of the species. In

considering whether features are essential to the conservation of the species, the Service may consider an appropriate quality, quantity, and spatial and temporal arrangement of habitat characteristics in the context of the life-history needs, condition, and status of the species. These characteristics include, but are not limited to space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing (or development) of offspring; and habitats that are protected from disturbance.

We derive the specific physical or biological features essential for Big Creek crayfish and St. Francis River crayfish from studies of both species' habitat, ecology, and life history. The primary habitat elements that influence resiliency of both species include water quality, water quantity, substrate, habitat connectivity, adequate available forage, and ratios or densities of nonnative species low enough to allow for maintaining populations of Big Creek crayfish or St. Francis River crayfish. A full description of the needs of individuals, populations, and the species is available from the SSA report; the individuals' needs are summarized below in Table 6.

Table 6. Life-history and resource needs of the Big Creek crayfish and St. Francis River crayfish.

Type of Requirement	Description
Macrohabitats	Pools, runs, and riffles
Stream Flow Velocity	Big Creek crayfish: low water velocity (0.00–0.35 meters per second (m/s) (0–1.14 feet per second (ft/s)) St. Francis River crayfish: low water velocity (0.00–0.35 m/s (0–1.14 f/s))
Water Depth	Big Creek crayfish: 0.06–0.49 m (0.20–1.61 ft) St. Francis River crayfish: 0.06–0.52 m (0.20–1.71 ft)
Water Temperature	1.1 °C (34.0 °F) to 28.9 °C (84.0 °F)
Embeddedness	Low, so that spaces under rocks and cavities in gravel remain available
Refugia	Under rocks or in shallow burrows in gravel
Diet	Invertebrates, periphyton, plant detritus

Summary of Essential Physical or Biological Features

In summary, we derive the specific physical or biological features essential to the conservation of Big Creek crayfish and St. Francis River crayfish from studies of these species' habitats, ecology, and life histories as described above. Additional information can be found in the SSA report (Service 2018) available on <http://www.regulations.gov> under Docket No. FWS–R3–ES–2019–0020. We have determined that the following physical or biological features are essential to the conservation of Big Creek crayfish and St. Francis River crayfish:

- (1) Stream flow velocity generally between 0 and 1.1 feet per second (ft/s) (0 and 0.35 meters per second (m/s)).

(2) Stream depths generally between 0.2 and 1.6 ft (0.06 and 0.49 m) for the Big Creek crayfish, and stream depths generally between 0.2 and 1.7 ft (0.06 and 0.52 m) for the St. Francis River crayfish.

(3) Water temperatures between 34 and 84 degrees Fahrenheit (°F) (1.1 and 28.9 degrees Celsius (°C)).

(4) Adequately low stream embeddedness so that spaces under rocks and cavities in gravel remain available to the Big Creek crayfish and St. Francis River crayfish.

(5) Spaces under rocks or shallow burrows in gravel that provide refugia.

(6) An available forage and prey base consisting of invertebrates, periphyton, and plant detritus.

(7) Connectivity among occupied stream reaches of the Big Creek crayfish, and connectivity among occupied stream reaches of the St. Francis River crayfish.

(8) Ratios or densities of nonnative species low enough to allow for maintaining the populations of the Big Creek crayfish and St. Francis River crayfish.

Special Management Considerations or Protection

When designating critical habitat, we assess whether the specific areas within the geographical area occupied by the species at the time of listing contain features that are essential to the conservation of the species and which may require special management considerations or protection. The features essential to the conservation of the Big Creek crayfish and St. Francis River crayfish may require special management considerations or protections to reduce the following threats: (1) Facilitated movement of nonnative crayfish (for example, bait bucket dumping); (2) nutrient pollution that impacts water quantity and quality, including, but not limited to, agricultural runoff and wastewater

effluent; (3) significant alteration of water quality (for example, heavy metal contamination); (4) forest management or silviculture activities that do not implement appropriate best management practices (BMPs) such that riparian corridors are impacted or sedimentation is increased; (5) sedimentation from construction of dams, culverts, and low water crossings, and pipeline and utility installation that creates barriers to movement; and (6) other watershed and floodplain disturbances that release sediments or nutrients into the water.

Management activities that could ameliorate these threats include, but are not limited to: Education to encourage responsible and legal bait use and proper disposal of unused bait; use of BMPs designed to reduce sedimentation, erosion, and bank side destruction; protection of riparian corridors and retention of sufficient canopy cover along banks; moderation of surface and ground water withdrawals to maintain natural flow regimes; increased use of stormwater management and reduction of stormwater flows into the systems; remediation of contaminated stream reaches and eroding stream banks; and reduction of other watershed and floodplain disturbances that release sediments, pollutants, or nutrients into the water.

Criteria Used To Identify Critical Habitat

As required by section 4(b)(2) of the Act, we use the best scientific data available to designate critical habitat. In accordance with the Act and our implementing regulations at 50 CFR 424.12(b), we review available information pertaining to the habitat requirements of the species and identify specific areas within the geographical area occupied by the species at the time of listing and any specific areas outside the geographical area occupied by the species to be considered for designation as critical

habitat. We are not currently proposing to designate any areas outside the geographical area occupied by the species because we have not identified any unoccupied areas that meet the definition of critical habitat.

We anticipate that recovery will require continued protection of existing populations and habitat, as well as ensuring there are adequate numbers of Big Creek crayfish and St. Francis River crayfish in stable subpopulations and that these subpopulations occur over a wide geographic area. This strategy will help to ensure that extreme events, such as the effects of flooding (for example, flooding that causes excessive sedimentation, nutrients, and debris to disrupt stream ecology), droughts, or chemical spills, cannot simultaneously affect all known subpopulations. The following rangewide potential recovery actions were considered in formulating this proposed critical habitat: (1) Mitigating or minimizing the effects of the spread of woodland crayfish, preventing additional introductions of woodland crayfish (and other nonnative species), investigating methods to slow or halt the expansion of woodland crayfish, and investigating methods of eradicating woodland crayfish; (2) maintaining the quality and quantity of habitat (including, but not limited to, preventing increased sedimentation rates); (3) preventing additional heavy metal contamination and remediating previous heavy metal contamination; (4) investigating other water quality issues that may impact crayfish abundance; and (5) maintaining existing genetic diversity and striving for representation of all major portions of the species' current ranges by maintaining connectivity.

Sources of data for this proposed critical habitat include the Missouri Department of Conservation, National Hydrography Dataset Plus (for mapping purposes), published

literature, and survey reports on water quality in various streams within the species' ranges (for more information, see the SSA report). We have also reviewed available information that pertains to the habitat requirements of this species. Sources of information on habitat requirements include studies conducted at occupied sites and published in peer-reviewed articles, agency reports, and data collected during monitoring efforts (Service 2018, the SSA report).

Geographical Areas Occupied by the species at the Time of Listing

As previously stated, for the purposes of critical habitat, the geographical area occupied is an area that may generally be de-lineated around species' occurrences, as determined by the Secretary. Such areas may include those areas used throughout all or part of the species' life cycle, even if not used on a regular basis (for example, migratory corridors, seasonal habitats, and habitats used periodically, but not solely by vagrant individuals) (50 CFR 424.02).

We consider the areas occupied at the time of listing to include all streams within occupied subwatersheds (at the 12-digit hydrologic unit level). Occupied watersheds were determined using data from the Missouri Department of Conservation. For the purposes of designating critical habitat, we also consider stretches of the St. Francis River between subwatersheds as occupied migratory corridors, based on genetic analyses that indicate there is gene flow among subwatersheds.

Based on this information, we consider all streams within the following subwatersheds in the Upper St. Francis River watershed to be currently occupied by the Big Creek crayfish at the time of this proposed listing (numbers in parentheses represent the 12-digit hydrologic codes): Big Lake Creek-St. Francis River (080202020503),

Blankshire Branch-St. Francis River (080202020204), Captain Creek-St. Francis River (080202020405), Cedar Bottom Creek-St. Francis River (080202020402), Clark Creek (080202020407), Cedar Bottom Creek (080202020501), Crane Pond Creek (080202020303), Headwaters St. Francis River (080202020201), Headwaters Twelvemile Creek (080202020403), Leatherwood Creek-St. Francis River (080202020406), Lower Big Creek (080202020304), Middle Big Creek (080202020302), Saline Creek-Little St. Francis River (080202020102), Turkey Creek-St. Francis River (080202020210), Twelvemile Creek (080202020404), and Upper Big Creek (080202020301). We also consider the entire St. Francis River upstream of 37.091254N, 90.447212W to be occupied because genetic analyses indicate gene flow among the subwatersheds.

For the St. Francis River crayfish, we consider all streams within the following subwatersheds to be currently occupied at the time of listing: Blankshire Branch-St. Francis River (80202020204), Captain Creek-St. Francis River (80202020405), Cedar Bottom Creek-St. Francis River (80202020402), Headwaters St. Francis River (80202020201), Headwaters Stouts Creek (80202020207), Hubble Creek-St. Francis River (80202020502), Leatherwood Creek-St. Francis River (80202020406), Little St. Francis River (80202020103), Lost Creek (80202020507), Marble Creek (80202020401), Musco Creek-Little St. Francis River (80202020101), O'Bannon Creek-St. Francis River (80202020206), Saline Creek-Little St. Francis River (80202020102), Stouts Creek (80202020208), Turkey Creek-St. Francis River (80202020210), and Wachita Creek-St. Francis River (80202020209). We also consider the entire St. Francis River upstream of 36.982104N, 90.335400W to be currently occupied, given that genetic analyses indicate

gene flow among subwatersheds. The proposed critical habitat designation for each species includes all known currently occupied streams within the historical range, as well as those that connect occupied streams, that contain the physical or biological features that will allow for the maintenance and expansion of existing populations. See **Proposed Critical Habitat Designations**, below, for a more detailed explanation of the units.

Areas Outside the Geographic Area Occupied at the Time of Listing

We are not proposing to designate any areas outside the geographical area currently occupied by the Big Creek crayfish or the St. Francis River crayfish because we did not find any unoccupied areas that were essential for the conservation of the species. The protection of the currently occupied subpopulations across the range would reduce the risk of extinction, by improving the resiliency of subpopulations in these currently occupied streams.

General Information on the Maps of the Proposed Critical Habitat Designation

The proposed critical habitat designation is defined by the map or maps, as modified by any accompanying regulatory text, presented at the end of this document under **Proposed Regulation Promulgation**. We include more detailed information on the boundaries of the proposed critical habitat designation in the discussion of individual units below. Further specific locality information can be found using the online critical habitat mapper tool available on the Environmental Conservation Online System (ECOS) at: <https://ecos.fws.gov/ecp/report/table/critical-habitat.html> and then clicking on the “online mapper” link. The online mapper can be used to find where areas of critical habitat overlap with specific addresses, places, or both. We will make the coordinates or plot points or both on which each map is based available to the public on

http://www.regulations.gov under Docket No. FWS–R3–ES–2019–0020, and at the field office responsible for the designation (see **FOR FURTHER INFORMATION CONTACT**, above).

When determining proposed critical habitat boundaries, we make every effort to avoid including developed areas, such as lands covered by buildings, pavement, and other structures, because such lands lack physical or biological features necessary for the Big Creek crayfish and the St. Francis River crayfish. The scale of the maps we prepared under the parameters for publication within the Code of Federal Regulations may not reflect the exclusion of such developed lands. Any such lands inadvertently left inside critical habitat boundaries shown on the maps of this proposed rule have been excluded by text in the proposed rule and are not proposed for designation as critical habitat. Therefore, if the critical habitat is finalized as proposed, a Federal action involving these lands would not trigger section 7 consultation under the Act with respect to critical habitat and the requirement of no adverse modification unless the specific action would affect the physical or biological features in the adjacent critical habitat.

Proposed Critical Habitat Designation

We are proposing to designate approximately 1,069 rmi (1,720 km) in one unit in the Upper St. Francis River watershed in Missouri as critical habitat for the Big Creek crayfish, and 1,043 rmi (1,679 km) in one unit in the Upper St. Francis River watershed in Missouri as critical habitat for the St. Francis River crayfish. Both units are currently occupied by the species, and there is some overlap between critical habitat units. Although these unit sizes are slightly larger than the ranges stated in Tables 1 and 2, we consider this slightly larger area occupied for the purposes of critical habitat because of

the need to maintain connectivity between occurrences as identified in physical or biological feature 7. These areas are intermittently occupied by the crayfish to connect occupied streams within the range of the Big Creek crayfish and St. Francis River crayfish, but are not occupied consistently. Adding these areas to the designations is consistent with our definitions of physical or biological features outlined in the regulations at 50 CFR 424.02. Both units contain some or all of the physical and biological features essential to the conservation of the species. Both units may require special management considerations or protection to address the introduction and spread of nonnative species and habitat degradation and its associated watershed-level effects on water quality, water quantity, habitat connectivity, and instream habitat suitability. Tables 7 and 8, below, show land ownership of the riparian areas surrounding the units and approximate river miles of the proposed designated units for the Big Creek crayfish and the St. Francis River crayfish. Because all streambeds are navigable waters, both proposed critical habitat units are managed by the State of Missouri. We are not currently proposing to designate any areas outside the geographical area occupied by the species because the occupied areas are adequate and encompass the historical range of both species.

Table 7. Ownership of adjacent land within the Big Creek Crayfish proposed critical habitat unit.

Ownership	Stream Miles (Kilometers)
Federal	296 (476)
State	42 (68)
Private	730 (1,175)
Total	1,069 (1,720)

Note: Stream miles may not sum due to rounding.

Big Creek Crayfish Unit

The Big Creek crayfish unit consists of approximately 1,069 rmi (1,720 km) in the Upper St. Francis River watershed upstream of Wappapello Dam in Iron, Madison, St. Francois, Washington, and Wayne Counties in Missouri. The unit consists of all of the streams in the following 12-digit hydrologic units: Big Lake Creek-St. Francis River (080202020503), Blankshire Branch-St. Francis River (080202020204), Captain Creek-St. Francis River (080202020405), Cedar Bottom Creek-St. Francis River (080202020402), Clark Creek (080202020407), Cedar Bottom Creek (080202020501), Crane Pond Creek (080202020303), Headwaters St. Francis River (080202020201), Headwaters Twelvemile Creek (080202020403), Leatherwood Creek-St. Francis River (080202020406), Lower Big Creek (080202020304), Middle Big Creek (080202020302), Saline Creek-Little St. Francis River (080202020102), Turkey Creek-St. Francis River (080202020210), Twelvemile Creek (080202020404), and Upper Big Creek (080202020301). The unit also consists of the entire St. Francis River upstream of 37.091254N, 90.447212W. The unit does not include any areas of adjacent land. A large portion of the riparian land adjacent to streams in this unit is privately owned (68 percent), with 28 percent in Federal ownership and 4 percent in State ownership.

Table 8. Ownership of adjacent land within the St. Francis River crayfish proposed critical habitat unit.

Ownership	Stream Miles (Kilometers)
Federal	329 (529)
State	22 (35)

Private	693 (1,115)
Total	1,043 (1,679)

Note: Stream miles may not sum due to rounding.

St. Francis River Crayfish Unit

The St. Francis River crayfish unit consists of approximately 1,043 rmi (1,679 km) in the Upper St. Francis River watershed upstream of Wappapello Dam in Iron, Madison, St. Francois, Washington, and Wayne Counties in Missouri. The unit consists of all of the streams in the following 12-digit hydrologic units: Blankshire Branch-St. Francis River (80202020204), Captain Creek-St. Francis River (80202020405), Cedar Bottom Creek-St. Francis River (80202020402), Headwaters St. Francis River (80202020201), Headwaters Stouts Creek (80202020207), Hubble Creek-St. Francis River (80202020502), Leatherwood Creek-St. Francis River (80202020406), Little St. Francis River (80202020103), Lost Creek (80202020507), Marble Creek (80202020401), Musco Creek-Little St. Francis River (80202020101), O'Bannon Creek-St. Francis River (80202020206), Saline Creek-Little St. Francis River (80202020102), Stouts Creek (80202020208), Turkey Creek-St. Francis River (80202020210), and Wachita Creek-St. Francis River (80202020209). The unit also consists of the entire St. Francis River upstream of 36.982104N, 90.335400W. The unit does not include any areas of adjacent land. A large portion of the riparian land adjacent to streams in this unit is privately owned (66 percent), with 32 percent in Federal ownership and 2 percent in State ownership.

Effects of Critical Habitat Designation

Section 7 Consultation

Section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. In addition, section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed under the Act or result in the destruction or adverse modification of proposed critical habitat.

We published a final regulation with a revised definition of destruction or adverse modification on August 27, 2019 (84 FR 45020). Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.

If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. Examples of actions that are subject to the section 7 consultation process are actions on State, tribal, local, or private lands that require a Federal permit (such as a permit from the U.S. Army Corps of Engineers under section 404 of the Clean Water Act (33 U.S.C. 1251 *et seq.*) or a permit from the Service under section 10 of the Act) or that involve some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat—and actions on State, tribal, local, or private

lands that are not federally funded, authorized, or carried out by a Federal agency—do not require section 7 consultation.

Compliance with the requirements of section 7(a)(2), is documented through our issuance of:

(1) A concurrence letter for Federal actions that may affect, but are not likely to adversely affect, listed species or critical habitat; or

(2) A biological opinion for Federal actions that may affect and are likely to adversely affect, listed species or critical habitat.

When we issue a biological opinion concluding that a project is likely to jeopardize the continued existence of a listed species and/or destroy or adversely modify critical habitat, we provide reasonable and prudent alternatives to the project, if any are identifiable, that would avoid the likelihood of jeopardy and/or destruction or adverse modification of critical habitat. We define “reasonable and prudent alternatives” (at 50 CFR 402.02) as alternative actions identified during consultation that:

(1) Can be implemented in a manner consistent with the intended purpose of the action,

(2) Can be implemented consistent with the scope of the Federal agency’s legal authority and jurisdiction,

(3) Are economically and technologically feasible, and

(4) Would, in the Director’s opinion, avoid the likelihood of jeopardizing the continued existence of the listed species and/or avoid the likelihood of destroying or adversely modifying critical habitat.

Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of the project. Costs associated with implementing a reasonable and prudent alternative are similarly variable.

Regulations at 50 CFR 402.16 set forth requirements for Federal agencies to reinitiate formal consultation on previously reviewed actions. These requirements apply when the Federal agency has retained discretionary involvement or control over the action (or the agency's discretionary involvement or control is authorized by law) and, subsequent to the previous consultation, we have listed a new species or designated critical habitat that may be affected by the Federal action, or the action has been modified in a manner that affects the species or critical habitat in a way not considered in the previous consultation. In such situations, Federal agencies sometimes may need to request reinitiation of consultation with us, but the regulations also specify some exceptions to the requirement to reinitiate consultation on specific land management plans after subsequently listing a new species or designating new critical habitat. See the regulations for a description of those exceptions.

Application of the "Destruction or Adverse Modification" Standard

The key factor related to the destruction or adverse modification determination is whether implementation of the proposed Federal action directly or indirectly alters the designated critical habitat in a way that appreciably diminishes the value of the critical habitat as a whole for the conservation of the listed species. As discussed above, the role of critical habitat is to support physical or biological features essential to the conservation of a listed species and provide for the conservation of the species.

Section 4(b)(8) of the Act requires us to briefly evaluate and describe, in any proposed or final regulation that designates critical habitat, activities involving a Federal action that may violate 7(a)(2) of the Act by destroying or adversely modifying such habitat, or that may be affected by such designation. Activities that the Services may, during a consultation under section 7(a)(2) of the Act, find are likely to destroy or adversely modify critical habitat include, but are not limited to:

- (1) Replacement or maintenance of river crossings and bridges;
- (2) Construction, replacement, removal, or abandonment of pipelines and electrical transmission lines;
- (3) Watershed restoration activities and stream restoration activities, including, but not limited to, stream liming, habitat improvements, natural channel design, and bank restoration;
- (4) Stocking of nonnative fish or of competitive, native sport fish;
- (5) Pesticide use;
- (6) Emergency response activities; and
- (7) Oil and gas exploration and extraction.

Exemptions

Application of Section 4(a)(3) of the Act

Section 4(a)(3)(B)(i) of the Act (16 U.S.C. 1533(a)(3)(B)(i)) provides that: “The Secretary shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan [INRMP] prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that

such plan provides a benefit to the species for which critical habitat is proposed for designation.” There are no Department of Defense lands within the proposed critical habitat designations.

Consideration of Impacts under section 4(b)(2) of the Act

Section 4(b)(2) of the Act states that the Secretary shall designate and make revisions to critical habitat on the basis of the best available scientific data after taking into consideration the economic impact, national security impact, and any other relevant impact of specifying any particular area as critical habitat. The Secretary may exclude an area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he determines, based on the best scientific data available, that the failure to designate such area as critical habitat will result in the extinction of the species. In making the determination to exclude a particular area, the statute on its face, as well as the legislative history, are clear that the Secretary has broad discretion regarding which factor(s) to use and how much weight to give to any factor.

The first sentence in section 4(b)(2) of the Act requires that we take into consideration the economic, national security or other relevant impacts of designating any particular area as critical habitat. We describe below the process that we undertook for taking into consideration each category of impacts and our analyses of the relevant impacts.

Consideration of Economic Impacts

Section 4(b)(2) of the Act and its implementing regulations require that we consider the economic impact that may result from a designation of critical habitat. To

assess the probable economic impacts of a designation, we must first evaluate specific land uses or activities and projects that may occur in the area of the critical habitat. We then must evaluate whether a specific critical habitat designation may restrict or modify specific land uses or activities for the benefit of the species and its habitat within the areas proposed. We then identify which conservation efforts may be the result of the species being listed under the Act versus those attributed solely to the designation of critical habitat for these particular species. The probable economic impact of a proposed critical habitat designation is analyzed by comparing scenarios both “with critical habitat” and “without critical habitat.” The “without critical habitat” scenario represents the baseline for the analysis, which includes the existing regulatory and socioeconomic burden imposed on landowners, managers, or other resource users potentially affected by the designation of critical habitat (for example, under the Federal listing as well as other Federal, State, and local regulations). The baseline, therefore, represents the costs of all efforts attributable to the listing of the species under the Act (i.e., conservation of the species and its habitat incurred regardless of whether critical habitat is designated). The “with critical habitat” scenario describes the incremental impacts associated specifically with the designation of critical habitat for the species. The incremental conservation efforts and associated impacts would not be expected without the designation of critical habitat for the species. In other words, the incremental costs are those attributable solely to the designation of critical habitat, above and beyond the baseline costs. These are the costs we use when evaluating the benefits of inclusion and exclusion of particular areas from the final designation of critical habitat should we choose to conduct a discretionary 4(b)(2) exclusion analysis.

For these proposed designations, we developed an incremental effects memorandum (IEM) for each species considering the probable incremental economic impacts that may result from the proposed designation of critical habitat. The information contained in our IEMs was then used to develop a screening analysis of the probable effects of the designation of critical habitat for both species (IEc 2019, entire). The purpose of the screening analysis is to filter out the geographic areas in which the critical habitat designation is unlikely to result in probable incremental economic impacts. In particular, the screening analysis considers baseline costs (i.e., absent critical habitat designation) and includes probable economic impacts where land and water use may be subject to conservation plans, land management plans, best management practices, or regulations that protect the habitat area as a result of the Federal listing status of the species. The screening analysis filters out particular areas of critical habitat that are already subject to such protections and are, therefore, unlikely to incur incremental economic impacts. Ultimately, the screening analysis allows us to focus our analysis on evaluating the specific areas or sectors that may incur probable incremental economic impacts as a result of the designation. This screening analysis, combined with the information contained in our IEM, constitutes our draft economic analysis (DEA) of the proposed critical habitat designations for the Big Creek crayfish and St. Francis River crayfish and is summarized in the narrative below.

Executive Orders (E.O.s) 12866 and 13563 direct Federal agencies to assess the costs and benefits of available regulatory alternatives in quantitative (to the extent feasible) and qualitative terms. Consistent with the E.O. regulatory analysis requirements, our effects analysis under the Act may take into consideration impacts to both directly

and indirectly affected entities, where practicable and reasonable. If sufficient data are available, we assess to the extent practicable the probable impacts to both directly and indirectly affected entities. As part of our screening analysis, we considered the types of economic activities that are likely to occur within the areas likely affected by the proposed critical habitat designations. In our February 22, 2019, IEM, we first identified probable incremental economic impacts associated with each of the following categories of activities: (1) Federal lands management (U.S. Forest Service); (2) pesticide use; (3) forest management/silviculture/timber; (4) development; (5) recreation (fish stocking and baitfish harvesting); (6) restoration activities (instream and watershed); (7) emergency response; and (8) water crossings (transportation, utility, oil and gas). Additionally, we considered whether the activities have any Federal involvement. Critical habitat designation generally will not affect activities that do not have any Federal involvement; under the ESA designation of critical habitat only affects activities conducted, funded, permitted, or authorized by Federal agencies. In areas where the Big Creek crayfish or the St. Francis River crayfish is present, Federal agencies already are required to consult with the Service under section 7 of the Act on activities they fund, permit, or implement that may affect the species. If we finalize this proposed critical habitat designation, consultations to avoid the destruction or adverse modification of critical habitat would be incorporated into the existing consultation process.

In our IEM, we attempted to clarify the distinction between the effects that would result from the species being listed and those attributable to the critical habitat designation (that is, difference between the jeopardy and adverse modification standards) for the Big Creek crayfish and St. Francis River crayfish. Because the designations of

critical habitat are being proposed concurrently with the listing, it has been our experience that it is more difficult to discern which conservation efforts are attributable to the species being listed and those which would result solely from the designation of critical habitat. However, the following specific circumstances in this case help to inform our evaluation: (1) The essential physical or biological features identified for critical habitat are the same features essential for the life requisites of the species, and (2) any actions that would result in sufficient harm or harassment to constitute jeopardy to either species would also likely adversely affect the essential physical or biological features of critical habitat. The IEM outlines our rationale concerning this limited distinction between baseline conservation efforts and incremental impacts of the designation of critical habitat for the species. This evaluation of the incremental effects has been used as the basis to evaluate the probable incremental economic impacts of these proposed designations of critical habitat.

The proposed critical habitat designations for the Big Creek crayfish and St. Francis River crayfish fall completely within areas that are currently occupied by the species. In these areas, any actions that may affect the species or its habitat would likely also affect proposed critical habitat, and it is unlikely that any additional conservation efforts would be required to address the adverse modification standard over and above those recommended as necessary to avoid jeopardizing the continued existence of the species. Therefore, the only additional costs that are expected in all of the proposed critical habitat designations are administrative costs, due to the fact that this additional analysis will require time and resources by both the Federal action agency and the Service.

Our analysis concluded that, in most circumstances, these costs would not reach the threshold of “significant” under E.O. 12866. For the critical habitat designations for both species, we anticipate a maximum of 115 section 7 consultations annually at a total incremental cost of approximately \$135,000 per year.

As we stated earlier, we are soliciting data and comments from the public on the DEA, as well as all aspects of the proposed rule and our required determinations. We may revise the proposed rule or supporting documents to incorporate or address information we receive during the public comment period. In particular, we may exclude an area from critical habitat if we determine that the benefits of excluding the area outweigh the benefits of including the area, provided the exclusion will not result in the extinction of this species.

During the development of a final designation, we will consider any additional economic impact information received through the public comment period, and as such areas may be excluded from the final critical habitat designation under section 4(b)(2) of the Act and our implementing regulations at 50 CFR 424.19.

Exclusions

Exclusions Based on Economic Impacts

Under section 4(b)(2) of the Act, we consider the economic impacts of specifying any particular area as critical habitat. As discussed above, we prepared an analysis of the probable economic impacts of the proposed critical habitat designations and related factors. Based on the draft analysis, the Secretary does not propose to exercise his discretion to exclude any areas from the final designations based on economic impacts. However, during the development of the final designations, we will consider any

additional economic impact information we receive during the public comment period, which may result in areas being excluded from the final critical habitat designations under section 4(b)(2) of the Act and our implementing regulations at 50 CFR 424.19.

Exclusions Based on National Security Impacts or Homeland Security Impacts

Under section 4(b)(2) of the Act, we consider whether there are lands owned or managed by the Department of Defense or Department of Homeland Security where a national security impact might exist. In preparing this proposal, we have determined that the lands within the proposed designations of critical habitat for both species are not owned or managed by the Department of Defense or Department of Homeland Security, and, therefore, we anticipate no impact on national security. Consequently, the Secretary does not propose to exercise his discretion to exclude any areas from the final designations based on impacts on national security.

Exclusions Based on Other Relevant Impacts

Under section 4(b)(2) of the Act, we consider any other relevant impacts, in addition to economic impacts and impacts on national security. We consider a number of factors, including whether there are permitted conservation plans covering the species in the area such as habitat conservation plans (HCPs), safe harbor agreements, or candidate conservation agreements with assurances, or whether there are non-permitted conservation agreements and partnerships that would be encouraged by designation of, or exclusion from, critical habitat. In addition, we look at the existence of Tribal conservation plans and partnerships, and consider the government-to-government relationship of the United States with Tribal entities. We also consider any social impacts that might occur because of the designation.

In preparing this proposal, we have determined that there are currently no HCPs or other management plans for the Big Creek crayfish or St. Francis River crayfish, and the proposed designations do not include any Tribal lands or trust resources. Accordingly, the Secretary does not propose to exercise his discretion to exclude any areas from the final designations based on other relevant impacts.

IV. Required Determinations

Clarity of the Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

- (1) Be logically organized;
- (2) Use the active voice to address readers directly;
- (3) Use clear language rather than jargon;
- (4) Be divided into short sections and sentences; and
- (5) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

Regulatory Planning and Review (Executive Orders 12866 and 13563)

Executive Order 12866 provides that the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget will review all significant rules.

OIRA has waived their review regarding their E.O. 12866 significance determination of this proposed rule.

Executive Order 13563 reaffirms the principles of E.O. 12866 while calling for improvements in the nation's regulatory system to promote predictability, to reduce uncertainty, and to use the best, most innovative, and least burdensome tools for achieving regulatory ends. The executive order directs agencies to consider regulatory approaches that reduce burdens and maintain flexibility and freedom of choice for the public where these approaches are relevant, feasible, and consistent with regulatory objectives. E.O. 13563 emphasizes further that regulations must be based on the best available science and that the rulemaking process must allow for public participation and an open exchange of ideas. We have developed this rule in a manner consistent with these requirements.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (RFA; 5 U.S.C. 601 *et seq.*), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA; 5 U.S.C. 801 *et seq.*), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (that is, small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of the agency certifies the rule will not have a significant economic impact on a substantial number of small entities. The SBREFA amended the RFA to require Federal agencies to provide a certification

statement of the factual basis for certifying that the rule will not have a significant economic impact on a substantial number of small entities.

According to the Small Business Administration, small entities include small organizations such as independent nonprofit organizations; small governmental jurisdictions, including school boards and city and town governments that serve fewer than 50,000 residents; and small businesses (13 CFR 121.201). Small businesses include manufacturing and mining concerns with fewer than 500 employees, wholesale trade entities with fewer than 100 employees, retail and service businesses with less than \$5 million in annual sales, general and heavy construction businesses with less than \$27.5 million in annual business, special trade contractors doing less than \$11.5 million in annual business, and agricultural businesses with annual sales less than \$750,000. To determine if potential economic impacts to these small entities are significant, we considered the types of activities that might trigger regulatory impacts under this designation as well as types of project modifications that may result. In general, the term “significant economic impact” is meant to apply to a typical small business firm’s business operations.

The Service’s current understanding of the requirements under the RFA, as amended, and following recent court decisions, is that Federal agencies are only required to evaluate the potential incremental impacts of rulemaking on those entities directly regulated by the rulemaking itself and, therefore, are not required to evaluate the potential impacts to indirectly regulated entities. The regulatory mechanism through which critical habitat protections are realized is section 7 of the Act, which requires Federal agencies, in consultation with the Service, to ensure that any action authorized, funded, or carried out

by the agency is not likely to destroy or adversely modify critical habitat. Therefore, under section 7, only Federal action agencies are directly subject to the specific regulatory requirement (avoiding destruction and adverse modification) imposed by critical habitat designation. Consequently, it is our position that only Federal action agencies would be directly regulated if we adopt the proposed critical habitat designations. There is no requirement under the RFA to evaluate the potential impacts to entities not directly regulated. Moreover, Federal agencies are not small entities. Therefore, because no small entities would be directly regulated by this rulemaking, the Service certifies that, if adopted, the proposed critical habitat designations will not have a significant economic impact on a substantial number of small entities.

In summary, we have considered whether the proposed designations would result in a significant economic impact on a substantial number of small entities. For the above reasons and based on currently available information, we certify that, if adopted, the proposed critical habitat designations will not have a significant economic impact on a substantial number of small business entities. Therefore, an initial regulatory flexibility analysis is not required.

Executive Order 13771

We do not believe this proposed rule is an E.O. 13771 (“Reducing Regulation and Controlling Regulatory Costs”) (82 FR 9339, February 3, 2017) regulatory action because we believe this rule is not significant under E.O. 12866; however, the Office of Information and Regulatory Affairs has waived their review regarding their E.O. 12866 significance determination of this proposed rule.

Energy Supply, Distribution, or Use—Executive Order 13211

Executive Order 13211 (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use) requires agencies to prepare Statements of Energy Effects when undertaking certain actions. In our economic analysis, we did not find that the designations of proposed critical habitat for the Big Creek crayfish and St. Francis River crayfish will significantly affect energy supplies, distribution, or use. Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.

Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.)

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 *et seq.*), we make the following findings:

(1) This proposed rule would not produce a Federal mandate. In general, a Federal mandate is a provision in legislation, statute, or regulation that would impose an enforceable duty upon State, local, or tribal governments, or the private sector, and includes both “Federal intergovernmental mandates” and “Federal private sector mandates.” These terms are defined in 2 U.S.C. 658(5)–(7). “Federal intergovernmental mandate” includes a regulation that “would impose an enforceable duty upon State, local, or tribal governments” with two exceptions. It excludes “a condition of Federal assistance.” It also excludes “a duty arising from participation in a voluntary Federal program,” unless the regulation “relates to a then-existing Federal program under which \$500,000,000 or more is provided annually to State, local, and tribal governments under entitlement authority,” if the provision would “increase the stringency of conditions of assistance” or “place caps upon, or otherwise decrease, the Federal Government’s

responsibility to provide funding,” and the State, local, or tribal governments “lack authority” to adjust accordingly. At the time of enactment, these entitlement programs were: Medicaid; Aid to Families with Dependent Children work programs; Child Nutrition; Food Stamps; Social Services Block Grants; Vocational Rehabilitation State Grants; Foster Care, Adoption Assistance, and Independent Living; Family Support Welfare Services; and Child Support Enforcement. “Federal private sector mandate” includes a regulation that “would impose an enforceable duty upon the private sector, except (i) a condition of Federal assistance or (ii) a duty arising from participation in a voluntary Federal program.”

The designation of critical habitat does not impose a legally binding duty on non-Federal Government entities or private parties. Under the Act, the only regulatory effect is that Federal agencies must ensure that their actions do not destroy or adversely modify critical habitat under section 7. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency. Furthermore, to the extent that non-Federal entities are indirectly impacted because they receive Federal assistance or participate in a voluntary Federal aid program, the Unfunded Mandates Reform Act would not apply, nor would critical habitat shift the costs of the large entitlement programs listed above onto State governments.

(2) We do not believe that this rule would significantly or uniquely affect small governments because the lands being proposed for critical habitat designation are

primarily Federally or privately owned, and are managed by the State of Missouri. These government entities do not fit the definition of “small governmental jurisdiction.”

Therefore, a Small Government Agency Plan is not required.

Takings—Executive Order 12630

In accordance with E.O. 12630 (Government Actions and Interference with Constitutionally Protected Private Property Rights), we have analyzed the potential takings implications of designating critical habitat for the Big Creek crayfish and St. Francis River crayfish in takings implications assessments. The Act does not authorize the Service to regulate private actions on private lands or confiscate private property as a result of critical habitat designation. Designation of critical habitat does not affect land ownership, or establish any closures or restrictions on use of or access to the designated areas. Furthermore, the designation of critical habitat does not affect landowner actions that do not require Federal funding or permits, nor does it preclude development of habitat conservation programs or issuance of incidental take permits to permit actions that do require Federal funding or permits to go forward. However, Federal agencies are prohibited from carrying out, funding, or authorizing actions that would destroy or adversely modify critical habitat. A takings implications assessment has been completed for both species and concludes that, if adopted, the designations of critical habitat for Big Creek crayfish and St. Francis River crayfish do not pose significant takings implications for lands within or affected by the designations.

Federalism—Executive Order 13132

In accordance with E.O. 13132 (Federalism), this proposed rule does not have significant Federalism effects. A federalism summary impact statement is not required. In

keeping with Department of the Interior and Department of Commerce policy, we requested information from, and coordinated development of these proposed critical habitat designations with, appropriate State resource agencies. From a federalism perspective, the designation of critical habitat directly affects only the responsibilities of Federal agencies. The Act imposes no other duties with respect to critical habitat, either for States and local governments, or for anyone else. As a result, the proposed rule does not have substantial direct effects either on the States, or on the relationship between the national government and the States, or on the distribution of powers and responsibilities among the various levels of government. The proposed designations may have some benefit to these governments because the areas that contain the features essential to the conservation of the species are more clearly defined, and the physical or biological features of the habitat necessary to the conservation of the species are specifically identified. This information does not alter where and what federally sponsored activities may occur. However, it may assist State and local governments in long-range planning because they no longer have to wait for case-by-case section 7 consultations to occur.

Where State and local governments require approval or authorization from a Federal agency for actions that may affect critical habitat, consultation under section 7(a)(2) of the Act would be required. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency.

Civil Justice Reform—Executive Order 12988

In accordance with Executive Order 12988 (Civil Justice Reform), the Office of the Solicitor has determined that the rule does not unduly burden the judicial system and that it meets the requirements of sections 3(a) and 3(b)(2) of the Order. We have proposed designating critical habitat in accordance with the provisions of the Act. To assist the public in understanding the habitat needs of the species, this proposed rule identifies the elements of physical or biological features essential to the conservation of the species. The proposed areas of designated critical habitat are presented on maps, and the proposed rule provides several options for the interested public to obtain more detailed location information, if desired.

Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.)

This rule does not contain information collection requirements, and a submission to the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*) is not required. We may not conduct or sponsor and you are not required to respond to a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act (NEPA), need not be prepared in connection with listing a species as an endangered or threatened species under the Act. We published a notice outlining our reasons for this determination in the *Federal Register* on October 25, 1983 (48 FR 49244).

It is our position that, outside the jurisdiction of the U.S. Court of Appeals for the Tenth Circuit, we do not need to prepare environmental analyses pursuant to NEPA in connection with designating critical habitat under the Act. This determination is discussed in the October 1983 *Federal Register* document just mentioned. This position was upheld by the U.S. Court of Appeals for the Ninth Circuit (*Douglas County v. Babbitt*, 48 F.3d 1495 (9th Cir. 1995), cert. denied 516 U.S. 1042 (1996)).

Government-to-Government Relationship with Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with tribes in developing programs for healthy ecosystems, to acknowledge that tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to tribes. As we have already discussed, there are no tribal lands in the proposed critical habitat designations, and we expect no effect on Tribes as a result of the proposed listings.

References Cited

A complete list of references cited in the SSA report and this proposed rule is available on the Internet at <http://www.regulations.gov> and upon request from the

Columbia, Missouri Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this proposed rule are the staff members of the Fish and Wildlife Service’s Species Assessment Team and the Columbia, Missouri Ecological Services Field Office.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

1. The authority citation for part 17 continues to read as follows:

AUTHORITY: 16 U.S.C. 1361–1407; 1531–1544; and 4201–4245, unless otherwise noted.

2. Amend § 17.11(h), the List of Endangered and Threatened Wildlife, by adding entries for “Crayfish, Big Creek” and “Crayfish, St. Francis River” in alphabetical order under CRUSTACEANS to read as set forth below:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Common name	Scientific name	Where listed	Status	Listing citations and applicable rules
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* * * * *				
CRUSTACEANS				
* * * * *				
Crayfish, Big Creek	<i>Faxonius peruncus</i>	Wherever found	T	[<i>Federal Register</i> citation when published as a final rule]; 50 CFR 17.46(b); ^{4d} 50 CFR 17.95(h). ^{CH}
* * * * *				
Crayfish, St. Francis River	<i>Faxonius quadruncus</i>	Wherever found	T	[<i>Federal Register</i> citation when published as a final rule]; 50 CFR 17.46(b); ^{4d} 50 CFR 17.95(h). ^{CH}
* * * * *				

3. Amend § 17.46 by adding paragraph (b) to read as set forth below:

§17.46 Special rules—crustaceans.

* * * * *

(b) Big Creek crayfish (*Faxonius peruncus*) and St. Francis River crayfish (*Faxonius quadruncus*).

(1) *Prohibitions.* The following prohibitions that apply to endangered wildlife also apply to the Big Creek crayfish and the St. Francis River crayfish. Except as provided under paragraph (b)(2) of this section and §§ 17.4 and 17.5, it is unlawful for any person subject to the jurisdiction of the United States to commit, to attempt to commit, to solicit another to commit, or cause to be committed, any of the following acts in regard to this species:

(i) Import or export, as set forth at § 17.21(b) for endangered wildlife.

(ii) The following activities that result in mortality of the species:

(A) Activities that impact crayfish habitat, riparian areas adjacent to crayfish sites, and habitat between connecting sites such that the species' reproduction or survival will be impacted or the effects of woodland crayfish invasion will be exacerbated. Such activities include, but are not limited to:

(1) Construction of instream low-water crossings;

(2) Destruction of riparian habitat that results in excessive sedimentation;

(3) Bridge construction; and

(4) Gravel mining.

(B) Activities that lead to the introduction of heavy metals into streams. Such activities include, but are not limited to, heavy metal mining.

(C) Activities that appreciably negatively affect water quality, chemistry, or quantity such that the species' reproduction or survival will be impacted. Such activities may include, but are not limited to, the release of wastewater effluent and agricultural runoff.

(D) Activities that impact hydrological flows such that the species' reproduction or survival will be impacted. Such activities include, but are not limited to, construction of dams and modification of stream channels.

(E) Activities that facilitate the spread of woodland crayfish or introduce additional woodland crayfish in occupied Big Creek crayfish or St. Francis River crayfish stream reaches. Such activities may include, but are not limited to, bait bucket dumping.

(iii) Possession and other acts with unlawfully taken specimens, as set forth at § 17.21(d)(1) for endangered wildlife.

(iv) Interstate or foreign commerce in the course of commercial activity, as set forth at § 17.21(e) for endangered wildlife.

(v) Sale or offer for sale, as set forth at § 17.21(f) for endangered wildlife.

(2) *Exceptions from prohibitions.* In regard to this species, you may:

(i) Conduct activities as authorized by a permit under §17.32.

(ii) Take, as set forth at § 17.21(c)(2) through (c)(4) for endangered wildlife.

(iii) Take, as set forth at § 17.31(b).

(iv) Take incidental to an otherwise lawful activity caused by:

(A) Restoration activities or other activities that will result in an overall benefit to one or both of the species. Such activities include, but are not limited to, remediation efforts by the Environmental Protection Agency and restoration efforts by the U.S. Forest Service, the Service's Natural Resource Damage Assessment Program or the Service's Partners for Fish and Wildlife Program.

(B) A person conducting research or education under a valid Missouri Department of Conservation Wildlife Collector's permit.

(C) A person capturing crayfish for educational or observational purposes provided that the crayfish is not removed from the site of capture.

(D) A person capturing and possessing up to 25 of each crayfish species for use as bait with a valid Missouri fishing license provided that the crayfish are used as bait only in the river in which they were collected and provided that any unused bait crayfish are released back into the river from which they were captured or are disposed of in a trash can.

(v) Possess and engage in other acts with unlawfully taken wildlife, as set forth at § 17.21(d)(2) for endangered wildlife.

3. Amend § 17.95, paragraph (h), by:

a. Adding an entry for “Big Creek Crayfish (*Faxonius peruncus*)” in the same alphabetical order as the species appears in the table in § 17.11(h); and

b. Adding an entry for “St. Francis River Crayfish (*Faxonius quadruncus*)” in the same alphabetical order as the species appears in the table in § 17.11(h).

The additions read as set forth below:

§ 17.95 Critical habitat—fish and wildlife.

* * * * *

(h) *Crustaceans.*

* * * * *

Big Creek Crayfish (*Faxonius peruncus*)

(1) The critical habitat unit is depicted for Iron, Madison, St. Francois, Washington, and Wayne Counties in Missouri, on the map in this entry.

(2) Within the critical habitat unit, the physical or biological features essential to the conservation of the Big Creek Crayfish consist of the following components:

(i) Stream flow velocity generally between 0 and 1.1 feet per second (ft/s) (0 and 0.35 meters per second (m/s)).

(ii) Stream depths generally between 0.2 and 1.6 feet (0.06 and 0.49 meters).

(iii) Water temperatures between 34 and 84 °F (1.1 and 28.9 °C).

(iv) Adequately low stream embeddedness so that spaces under rocks and cavities in gravel remain available to the Big Creek crayfish.

(v) Spaces under rocks or shallow burrows in gravel that provide refugia.

(vi) An available forage and prey base consisting of invertebrates, periphyton, and plant detritus.

(vii) Connectivity among occupied stream reaches of the Big Creek crayfish.

(viii) Adequately low ratios or densities of nonnative species that allow for maintaining populations of the Big Creek crayfish.

(3) Critical habitat does not include manmade structures (such as buildings, aqueducts, runways, roads, and other paved areas) and the land on which they are located existing within the legal boundaries on the effective date of the final rule.

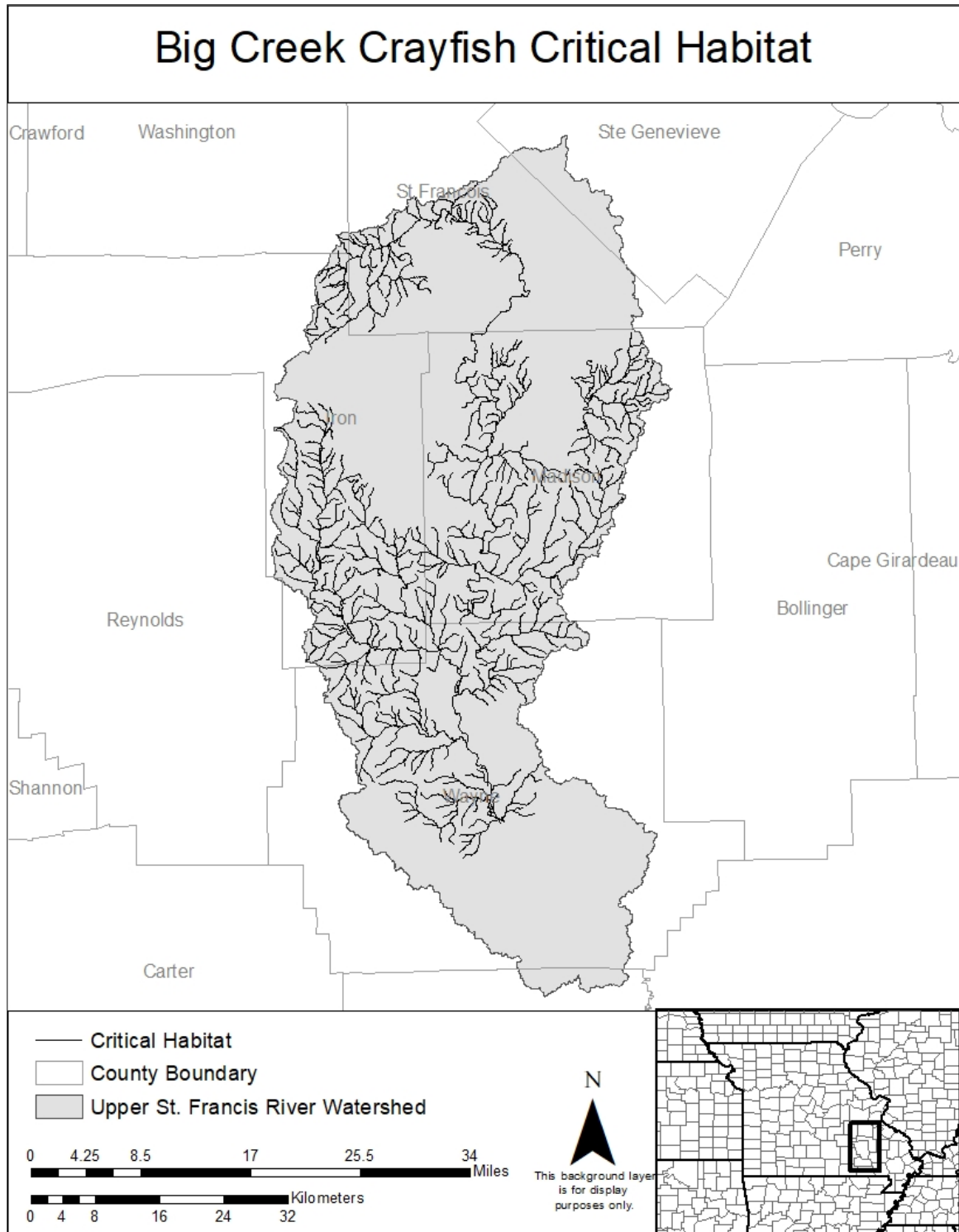
(4) *Critical habitat map unit.* The National Hydrography Dataset Plus (NHDPlus) was the geospatial data used to delineate critical habitat. NHDPlus is a national geospatial surface water framework that integrates the National Hydrography Dataset with the National Elevation Dataset and the Watershed Boundary Dataset. NHDPlus uses medium resolution (1:100,000-scale) data with a geographic projection and NAD83 datum. Critical habitat was delineated by including all streams within subwatersheds (at the 12-digit hydrologic unit level) occupied by the Big Creek crayfish. Occupied watersheds were defined using data from the Missouri Department of Conservation; the entire St. Francis River upstream of 37.091254N, 90.447212W is also considered occupied as a migratory route. The map in this entry, as modified by any accompanying regulatory text, establishes the boundaries of the critical habitat designation. The coordinates or plot points or both on which the map is based are

available to the public at <http://www.regulations.gov> under Docket No. FWS–R3–ES–2019–0020 and at the Columbia, Missouri Ecological Services Field Office. You may obtain field office location information by contacting one of the Service regional offices, the addresses of which are listed at 50 CFR 2.2.

(5) Upper St. Francis River Watershed Unit—Iron, Madison, St. Francois, Washington, and Wayne Counties, Missouri.

(i) The unit consists of all of the streams (approximately 1,069 river miles (1,720 kilometers)) upstream of Wappapello Dam in the following subwatersheds (numbers in parentheses represent the 12-digit hydrologic codes): Big Lake Creek-St. Francis River (080202020503), Blankshire Branch-St. Francis River (080202020204), Captain Creek-St. Francis River (080202020405), Cedar Bottom Creek-St. Francis River (080202020402), Clark Creek (080202020407), Cedar Bottom Creek (080202020501), Crane Pond Creek (080202020303), Headwaters St. Francis River (080202020201), Headwaters Twelvemile Creek (080202020403), Leatherwood Creek-St. Francis River (080202020406), Lower Big Creek (080202020304), Middle Big Creek (080202020302), Saline Creek-Little St. Francis River (080202020102), Turkey Creek-St. Francis River (080202020210), Twelvemile Creek (080202020404), and Upper Big Creek (080202020301). The unit also consists of the entire St. Francis River upstream of 37.091254N, 90.447212W. The unit does not include any areas of adjacent land. This unit includes stream habitat up to bank full height.

(ii) Map of Upper St. Francis River Watershed Unit of Big Creek crayfish critical habitat follows:



St. Francis River Crayfish (*Faxonius quadruncus*)

(1) The critical habitat unit is depicted for Iron, Madison, St. Francois, Washington, and Wayne Counties in Missouri, on the map in this entry.

(2) Within the critical habitat unit, the physical or biological features essential to the conservation of the St. Francis River crayfish consist of the following components:

(i) Stream flow velocity generally between 0 and 1.1 feet per second (ft/s) (0 and 0.35 meters per second (m/s)).

(ii) Stream depths generally between 0.2 and 1.7 feet (0.06 and 0.52 meters).

(iii) Water temperatures between 34 and 84 °F (1.1 and 28.9 °C).

(vi) Adequately low stream embeddedness so that spaces under rocks and cavities in gravel remain available to the St. Francis River crayfish.

(v) Spaces under rocks or shallow burrows in gravel that provide refugia.

(vi) An available forage and prey base consisting of invertebrates, periphyton, and plant detritus.

(vii) Connectivity among occupied stream reaches of the St. Francis River crayfish.

(viii) Adequately low ratios or densities of nonnative species that allow for maintaining populations of the St. Francis River crayfish.

(3) Critical habitat does not include manmade structures (such as buildings, aqueducts, runways, roads, and other paved areas) and the land on which they are located existing within the legal boundaries on the effective date of the final rule.

(4) *Critical habitat map unit.* The National Hydrography Dataset Plus (NHDPlus) was the geospatial data used to delineate critical habitat. NHDPlus is a national geospatial surface water framework that integrates the National Hydrography Dataset with the National Elevation Dataset and the Watershed Boundary Dataset. NHDPlus uses medium resolution (1:100,000-scale) data with a geographic projection and NAD83 Datum. Critical habitat was delineated by including all streams within subwatersheds (at the 12-digit hydrologic unit level) occupied by the St. Francis River crayfish. Occupied watersheds were defined using data from the Missouri Department of Conservation; the entire St. Francis River upstream of 36.982104N, 90.335400W is also considered occupied as a migratory route. The map in this entry, as modified by any accompanying regulatory text, establishes the boundaries of the critical habitat designation. The coordinates or plot points or both on which the map is based are available to the public at <http://www.regulations.gov> under Docket No. FWS–R3–ES–2019–0020 and at the Columbia, Missouri Ecological Services Field Office. You may obtain field office location information by contacting one of the Service regional offices, the addresses of which are listed at 50 CFR 2.2.

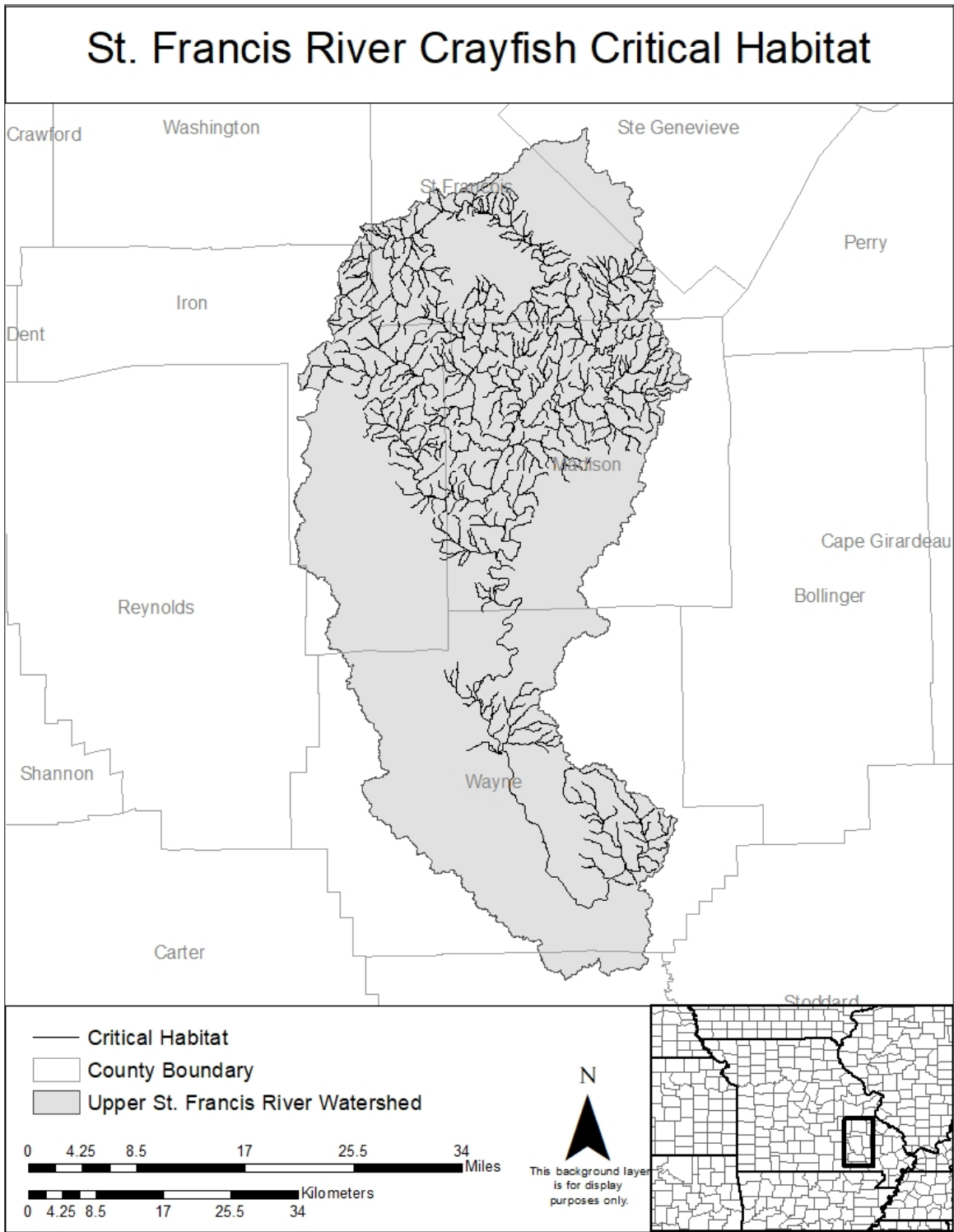
(5) Upper St. Francis River Watershed Unit—Iron, Madison, St. Francois, Washington, and Wayne Counties, Missouri.

(i) The unit consists of all of the streams (approximately 1,043 river miles (1,679 kilometers)) upstream of Wappapello Dam in the following subwatersheds (numbers in parentheses represent the 12-digit hydrologic codes): Blankshire Branch-St. Francis River (80202020204), Captain Creek-St. Francis River (80202020405), Cedar Bottom Creek-St. Francis River (80202020402), Headwaters St. Francis River (80202020201),

Headwaters Stouts Creek (80202020207), Hubble Creek-St. Francis River (80202020502), Leatherwood Creek-St. Francis River (80202020406), Little St. Francis River (80202020103), Lost Creek (80202020507), Marble Creek (80202020401), Musco Creek-Little St. Francis River (80202020101), O'Bannon Creek-St. Francis River (80202020206), Saline Creek-Little St. Francis River (80202020102), Stouts Creek (80202020208), Turkey Creek-St. Francis River (80202020210), and Wachita Creek-St. Francis River (80202020209). The unit also consists of the entire St. Francis River upstream of 36.982104N, 90.335400W. The unit does not include any areas of adjacent land. The Upper St. Francis River Watershed Unit includes stream habitat up to bank full height.

(ii) Map of Upper St. Francis River Watershed Unit of St. Francis River crayfish

critical habitat follows:



* * * * *

Signed: _____

Aurelia Skipwith
Director,
U.S. Fish and Wildlife Service.